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ABSTRACT

Sections of this report introduce many of the activities undertaken in 1982 within the purview of the Mt. Druitt (Australia) longitudinal study. Included are reports of (1) the 1982 math investigation, (2) a longitudinal study of child growth and development and the incidence of physical defects at ages 9 and 10, (3) an investigation of classroom disruption in the primary grades, (4) a study of pupils' and teachers' expectations for the achievement of children in their fourth year of schooling, (5) an investigation of relationships between family characteristics and school-related outcomes, and (6) an exploration of how well schools serve disadvantaged pupils. (RH)

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MT. DRUITT LONGITUDINAL STUDY

SCHOOL OF EDUCATION MACQUARIE UNIVERSITY, NORTH RYDE, AUSTRALIA 2113

SECOND MAJOR REPORT

1983

Peter O'Brien

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A major delight to the research staff of the Study is our constant contact with the children, who unfailingly greet us with cheery hellos and most welcoming smiles. This Longitudinal Study is about children and their experiences; we believe that far reaching recommendations, affecting the lives of many children in many places, will result. We believe also that children elsewhere would join with the research team, if they could, to say a very special thank you to all the children who form the focus of the Mt Druitt Longitudinal Study.

MT DRUITT LONGITUDINAL STUDY

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INTRODUCTION

In previous reports of the two Mt Druitt studies (the Mt Druitt Early Childhood Project and the Mt Druitt Longitudinal Study) an annual retrospective review of the activities undertaken was communicated. Twelve monthly reporting, of course, makes a great deal of sense, particulary to groups such as funding bodies and schools which organize their affairs on a yearly basis. This is not necessarily the case with educational research, however, in which a more natural division of time may occur. To the researcher, the time taken from original conceptualization of a study to the finished report may often take longer than twelve months but this research unit of time is a meaningful way for the researcher to think about tasks. Hence the change in title of this Report from that adopted previously; we have written a Major, rather than Annual Report.

The material in sections of the Second Major Report of the Mt Druitt Longitudinal Study which follows is also rather different from the material contained in previous Reports in another way. Previously the content of Annual Reports was written specifically for that Report. Often the matters of the Annual Reports were later rewritten so as to find more ready acceptance as journal articles or as papers delivered at Conferences. This Second Major Report sees a reversal of that procedure as much of the material contained here was written originally for another purpose and has been reshaped, if necessary , to fit the format of an overall review of the activities of the Longitudinal Study. Some sections, therefore, are precis versions of much lengthier papers; several sections will find publication elsewhere, other than solely in this Report. Nevertheless, the sections of the Report which follow do introduce most of the activities of 1982 and indicate the variety of data pools which have been collected and the manner in which these have been analysed.

We believe the reader will find this an acceptable way to become acquainted with those Mt Druitt Longitudinal Study activities completed since the First Annual Report of May/June 1981. One most important consideration of the research team has been the minimization of time spent in writing materials for restricted audiences and the maximization of the impact of the Study. It was found that approximately six weeks was spent in writing the First Annual Report of the Study. Time spent in this way was not only useful for those who rely upon the Report for an understanding of the Study and its activities. It is also true that the action of committing to paper a detailed account of activities ensures a thorough "thinking-through" and, in this sense, the writers also benefited. The Study team shared a belief, however, that given the size and variety of the data pools and the necessity to report these, the use of lengthy periods in writing materials for restricted publication and use was difficult to justify. It is possible for the reader to perceive in this Second Major Report the format, and much of the material, for a major book on the Mt. Druitt Longitudinal Study. We believe our revised approach to reporting will be most useful to us and both interesting and useful to the reader.

TECHNICAL REPORT ON 1982 MATHS INVESTIGATION

This report is a technical description of the maths achievement investigation carried out by the Mt Druitt Longitudinal Study in 1982. The Investigation is one strand of the Study's research into the social, psychological and educational development of children in Mt Druitt. It was designed specifically to expand the Study's longitudinal data bank about the academic skills of Mt Druitt children who were in Year 4 in 1982.

The maths achievement investigation involved the design and administration of a pencil and paper maths test, and the analysis of its results. Its aims were:

- to describe or detect any individual and group differences in maths achievement among the Study's sample of Year 4 children.
- to monitor change in maths skills since the 1981 maths investigation, and to be suitable for the same use in 1983.
- to identify the quality or limits of the children's understanding of mathematical concepts.

TEST DESIGN

The test design implications of the above aims were:

- the Test should differentiate maximally among individuals;
- the Test should incorporate those items from the 1981 maths test which had the greatest potential for improved performance;
- the Test should investigate a wide variety of maths skills and concepts (amenable to testing) and have a sufficiently high ceiling to permit the Test's use again on the sample in 1983.

A norm-referenced test was adopted as the appropriate way to emphasize individual differences in achievement. An item bank was assembled by combining those items which fewest children answered correctly in the 1981 test, with a series of items devised to test the skills of using operations on counting numbers at Year 4 and above level (as described by the NSW Education Department's Mathematics Curriculum: Primary Schools). The series of items was devised to test not only the specific content area described above, but also to test three specific aspects of problem structure which previous research had identified as developmentally significant. The three structural aspects were: number size (Collis, 1975); the position of the missing element or answer box (Lunzer, Bell and Shiu, 1976); and the problem format (i.e. word or number format). The item bank comprised sets of items parallel in content but divergent in one of these three structural aspects. All items in the data bank were trialled on a sample of 90 children who comprised the entire year 4 enrolment at a Mt Druitt school not in the Study. The trial identified several poor items. These were modified or omitted, and the result was an 83 item maths test.

Test Specifications

The Test was structured to incorporate six subscales: addition; subtraction; multiplication; concepts; word problems; and number problems parallel to these word problems. Note that the word and number subscales are superordinate to the operation subscales and not presented separately.

To avoid the problem of testee fatigue, the Test was divided into four parts to be administered singly on four consecutive mornings. All parts were of equal length and item variety. It was planned to further refine this measure following testing, by excluding items found to be poor discriminators of maths achievement.

ADMINISTRATION

During April, the Test was administered by class teachers to all Year 4 classes in the Study's sample, except for O.A. classes. The total number of classes tested was 33. The teachers had been instructed in the use of the desired standardised test administration procedures, and were shown the Test the day before testing commenced. Altogether 692 children were tested. These included the 342 girls and 350 boys who comprise the total Year 4 enrolment (minus the O.A. children) of five Mt Druitt schools and three contrast schools. The resulting protocols were scored by computer.

DATA ANALYSIS

Test Analysis

As a preliminary to the use of the Test as a maths achievement measure, several analyses were performed on the test data to check that the overall Test could be regarded as a measure of maths achievement viewed as a single latent trait. Each of the four subscales was similarly checked as a preparation for later analysis of interaction between content areas and various independent variables.

A normal ogive one parameter model and two parameter model (Lord and Novick, 1974) were applied to the test data using the NOHARM program (McDonald, 1980). No difference in the results for the two models emerged, so the simpler, one parameter model was preferred. It proved to be a good fit for most of the 82 items (one of the original 83 items being excluded from the analysis when it was found to contain a typing error), and for most items in each subscale. The normal ogive item characteristics were examined to identify any items with values outside the 2 standard deviation range on a normal ogive curve. Five items were identified and consequently removed from the Test as poor discriminators.

To determine whether the word format discriminated against poor readers in the sample (and hence tested reading skill rather than maths skill), separate subscores for word problems and number problems were computed and compared with existing data on the sample's reading achievement (ACER scores on Word Comprehension and Word Knowledge). The correlation coefficients for number subscore and reading scores were the same as for word problems and reading scores. This indicated that both the word items and their corresponding number items were measuring related skills and the word format did not discriminate against poor readers. Hence, performance on the word subscale could be compared with that on the number subscale to ascertain the relative difficulty of different problem formats.

The refined test and final measure adopted for subsequent analysis consisted of: the whole test of 77 items measuring a single latent trait called maths achievement; a subscale of 22 items measuring a single latent trait called addition skill; a subscale of 23 items measuring a single latent trait called subtraction skill; a subscale of 15 items measuring a single latent trait called multiplication skill; a subscale of 17 items measuring a single latent trait called concepts;a subscale of 26 items measuring a single latent trait called word problems; 26 items measuring a single latent trait called number problems. Note that some items omitted from the total test on the basis of their unsuitable item characteristics, were retained in the number problems subscale so that this subscale matched the word problem subscale exactly and the relative difficulty of different problem formats could be assessed.

Maths Achievement Analysis

To obtain a description of individual maths achievement, total and subtotal scores were computed for each child in the sample. These were reported to the relevant teachers in the sample and are not included here for reasons of practicality and privacy; they were also used as the dependent variable in further analyses of maths achievement.

To fulfil the investigation's aim of describing group differences in maths achievement, a series of BREAKDOWN analyses on total test scores and the various subscale scores were performed. These analyses yielded descriptive statistics for the following groups: subsample; school; gender. The results are presented in Table 1 overleaf.

Table 1 shows that the Mt Druitt subsample of children achieved a lower average score than the Contrast subsample on the Test as a whole, and on each of the subscales. ANOVA analyses confirmed that the 13 point difference between the two subsamples' mean total scores was statistically significant at the .000 level. This finding is consistent with the 1981 Maths Investigation's findings. Since a 13 point difference is equivalent to a 13 item difference, it can be described also as an educationally significant result. The Mt Druitt subsample's standard deviation from the mean was slightly higher (3 points) than the Contrast subsample's standard deviation from the mean. This finding is also consistent with the 1981 findings. The difference between the subsamples' mean score on each of the four operations varied in a 3 point range. The minimum difference was obtained for subtraction and the maximum for concepts. In both cases, there was no difference in standard deviation values.

Table 1 also shows that school group means for total score varied within a 23 point range. Subscores also varied with school group. ANOVA analyses confirmed that school group was a statistically significant main effect (at the .000 level) on total score and subscores. To determine where the significant differences lie among the school means, multiple classification analyses (Scheffe procedure) were performed on the total score and subscores. The results indicated that, at the .05 level, two Contrast schools were significantly different from each other in total score, subtraction, multiplication and concepts. Significant differences did not occur within the Mt Druitt subsample. This subsample emerged as homogeneous in maths achievement. One Contrast school's mean total score was significantly different to each of the Mt Druitt schools. Another Contrast school's total score was significantly different to all but one Mt Druitt school. The third Contrast school's total score differed significantly from only two Mt Druitt schools. The school group standard deviation from the mean was consistently higher within the Mt Druitt subsample than within the Contrast subsample, indicating more variable individual achievement among Mt Druitt children.

Fewer significant differences were found among the operation subscores for all eight schools. However, the subscores of each Contrast school differed significantly from at least two Mt Druitt schools. The greatest difference emerged on the concepts subscore, and the results are reported overleaf in Table 2.

No statistically significant gender differences were found on the total test scores or subscores. Neither were any statistically significant differences found between the total test scores of the 153 Mt Druitt children who were formerly preschoolers in the Early Childhood Project and the 44 who were formerly non-preschoolers in that Project.

TABLE 1

GROUP DIFFERENCES IN MATHS ACHIEVEMENT

GROUPS	N	ACHIEVEMENT SCORES Total (Max = 77)		Addition (Max = 22)		Subtraction (Max = 23)		Multiplication (Max = 15)		Concepts (Max = 17)		Word Problems (Max = 26)		Number Problems (Max = 26)	
		Mean	s.d.	Mean	s.d.	Mean	s.d.	Mean	s.d.	Means	s.d.	Mean	s.d.	Mean	s.d.
Mt Druitt Subsample	472	46.37	15.28	16.17	4.85	16.73	3.61	9.07	3.95	7.59	3.8	15.56	5.47	16.8	4.95
School 1	89	41.72	16.97	15.11	5.97	12.45	5.08	8.48	4.02	5.82	3.92	14.52	6.01	14.99	5.63
School 2	50	49.1	15.22	16.8	4.73	14.38	4.62	9.94	4.17	8.14	3.48	16.62	4.91	17.56	4.96
School 3	44	50.36	17.71	16.59	5.6	15.34	5.29	9.30	4.15	9.46	4.3	16.82	5.84	18.21	5.6
School 4	100	43.72	15.86	15.67	4.94	12.7	5.25	8.41	4.27	7.07	3.12	14.63	5.67	15.57	5.06
School 5	189	48.32	12.73	16.66	3.91	14.33	4.14	9.42	3.57	8.12	3.69	16	4.96	17.78	3.95
Contrast Subsample	218	59.17	12.57	18.82	3.53	17.06	4.25	11.99	3.13	11.73	3.96	19.89	4.55	20.63	3.99
School 7	79	59.51	9.92	19.51	2.46	16.73	3.6	11.66	2.6	12.03	3.9	20.63	3.69	20.75	3.32
School 8	66	64.85	9.35	19.7	3.03	18.96	3.5	13.82	1.39	12.82	3.73	21.32	3.87	22.17	3.2
School 9	73	53.67	15.19	17.27	4.35	15.69	4.89	10.69	3.94	10.39	3.91	17.78	5.19	19.11	4.7
Males	350	49.82	15.57	16.85	4.59	14.61	4.9	9.82	3.95	8.77	4.33	16.6	5.48	17.85	5.01
Females	342	50.92	15.86	17.11	4.75	14.94	4.94	10.15	3.97	8.99	4.28	17.25	5.65	18.12	5.04
Whole Sample	692	50.42	15.65	17	4.64	14.78	4.89	9.98	3.95	8.88	4.3	16.92	5.57	17.99	5.02

TABLE 2

MULTIPLE CLASSIFICATION ANALYSIS - SCHOOL GROUP DIFFERENCES ON CONCEPTS SUBSCORE

(* denotes pairs of groups significantly different at the .05 level)

MEAN	SCHOOL GROUP	GRPO1	GRPO4	GRPO5	GRPO2	GRPO3	GRPO9	GRPO7	GRPO8
5.6742	GRP01								
6.9400	GRP04								
7.9153	GRP05	*							
7.9800	GRP02	*							
9.1364	GRP03	*							
10.0274	GRP09	*	*	*					
11.6076	GRP07	*	*	*	*	*			
12.3788	GRP08	*	*	*	*	*	*		

Analysis of Longitudinal Change in Sample's Maths Achievement

A correlation coefficient of .8298 (significant at .000 level for N = 678) was found to exist between scores on the 1981 test and the 1982 test. This statistic indicates a high consistency of performance by the Sample.

To determine whether the Sample's level of maths achievement had changed between the 1981 and 1982 testings, total scores for the set of 11 items common to both tests were computed and compared. The results are reported below in Figure 1.

FIGURE 1

1981 and 1982 Scores on Longitudinal Items - Relative Frequency Distribution

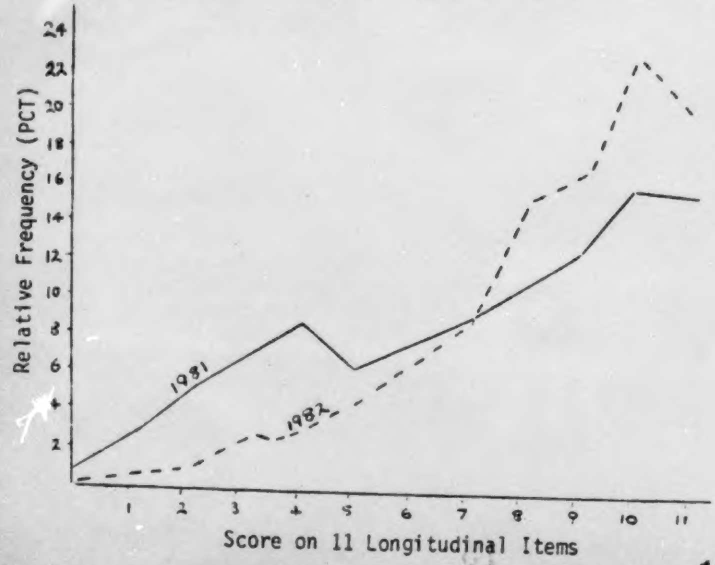

Figure 1 indicates that a small positive change in performance on the 11 items has occurred between 1981 and 1982.

A series of CROSSTABS analyses were performed to enable longitudinal comparison of achievement on individual items. Table 3 below shows that, for any item, there was a group of children whose performance improved, another whose performance declined and two further groups of children whose performance was unchanged (one group erred on both occasions, the other succeeded). However, the relative size of these groups varied with the individual item. This variation is of developmental interest because it distinguishes those items which continue to pose difficulty for the Sample from those items which have become soluble problems. Items on which large numbers of children continue to err or to decline, are beyond the level attained by the Sample in the maths skills hierarchy, e.g. 1/4 x 12 = □ and □ - 7 = 1. However, items on which small numbers of children err or decline, but large numbers improve, reflect an upward shift in the hierarchy by the Sample since 1981, e.g. □ + 8 = 9. Items, like 4 + □ = 7 + 4, which have equally high numbers improving as continuing to err, indicate that the Sample is in transition between one level and the next.

TABLE 3

Changed Performance - Whole Sample

Item	Incorrect '81 & '82	Correct '81 Incorrect '82	Incorrect '81 Correct '82	Correct '81 & '82
□ = 14 - 8	8.6	9.8	17.9	63.8
□ = 18 - 12	8.9	11.1	9.8	60.2
□ = 5 - 0	9.2	18.9	11.1	60.8
□ - 7 = 1	28.7	14.5	17	39.8
□ + 2 = 7	6.8	1.8	20.7	70.7
□ + 8 = 9	6.4	1	22.5	70.1
4 + □ = 7 + 4	24.1	5	25.1	45.7
□ + 5 = 5 + 2	23	5.6	19.4	51.5
5 x 4 = □	5.3	2.1	21	71.6
1/2 x 16 = □	10.5	3.7	16.9	68.9
1/4 x 12 = □	34.8	11.4	19.8	34

ERROR ANALYSIS

To determine the quality of errors and hence obtain information about children's conceptual difficulties, an error analysis was performed in two stages. First, a list of all error values and their frequency was obtained for each item. These lists revealed that some error values were isolated cases while others were a group phenomenon of variable size (ranging from 4 to 398). For example, error responses to the item □ - 7 = 1 included one group of 262 children, one group of 11 children, one group of 5 children and three groups of 4 children. Moreover, many of the group error values could be explained in terms of the possible ways in which children obtained them. These explanations provided the basis for an error category system and showed that most errors reflect rational attempts at problem solving.

The second stage of the analysis involved the use of this category system to summarise error data. Note that the system focuses exclusively on simple errors which occurred for large groups of children and ignores the complex errors which tended to be idiosyncratic. Two examples of simple error response categories in the system are "wrong operation" and "inaccurate computing'. An example of a complex error response excluded from the system is "combined wrong operation and inaccurate computing".

The results reported in the error analysis show that error rate varied widely in each subscale. It varied from 8% to 49% on the addition subscale, from 14% to 80% on the subtraction subscale, 7% to 59% on the multiplication subscale and 8% to 89% on the concepts subscale. The item error rate varied even for items with similar (but not identical) structure. This indicated that the difficulty of an item could be influenced by one aspect of structure. For example, a consistent finding among the error responses to matched pairs of items in the multiplication and addition subscales was the greater difficulty of the word version of a maths problem compared to its number version. In the subtraction subscale, matched word/number pairs of items showed the reverse trend. In 7 of the 10 pairs of subtraction problems, children were more successful at solving the word version of a problem. Among the several possible explanations for this trend is that a word context enables more children to comprehend and compute subtraction problems than does an algorism, whereas this is not the case for addition and multiplication items. Possibly the difference indicates Year 4 children's greater need for concrete referents when using the subtraction operation than when using addition and multiplication. In these operations, contextual referents may not be required and, when given, may distract children from an automatic adding or multiplying response. Also, a word context provides the opportunity for solving a problem by alternative operations. Hence, a difficult operation can be avoided. For example, children may solve 14 - ☐ = 6 by counting backwards from 14 until 6 is reached or adding on from 6 in the absence of an operation sign to direct their response to the problem.

As expected, there was also a difference in error rate between big number and small number versions of the same problem in the addition and subtraction subscale. For example -

☐ - 3 = 14	31% error rate
☐ - 13 = 6	66% error rate
17 - ☐ = 6	14% error rate
65 - ☐ = 22	47% error rate
☐ + 2 = 7	9% error rate
☐ + 8 = 80	27% error rate

This error rate difference suggested that the size of numbers in a number problem can inhibit the application of rational strategies to a task. In the above examples, a group of children who chose the appropriate operation for the problem with small numbers, chose inappropriately for the same task involving large numbers. Typically, they chose to apply the given operation sign to the given large numbers without regard for the position of the equation sign. The influence of number size on problem solving ability can be explained by cognitive development theory. Collis and Biggs (1979) propose that children of this age tend to be able to operate on numbers based only in immediately observable experience. Children tend to find big numbers meaningless because they are not directly related to verifiable experience.

The position of the missing element in an incomplete number sentence, also proved to be a structural variable affecting item difficulty. When number size and problem format are held constant, the error rate for box-first addition and subtraction items is greater than for box medial items and box last items. Box-last items are easiest of all. This is to be expected since such items are most frequently presented to children in maths lessons, and require a left to right direction of working (which is also the order of the underlying physical manipulation).

The error response data suggests the existence of a hierarchy of difficulty (among both subtraction and addition items) that is based on structural variables (i.e. box position, problem format and number size). The difficulty hierarchy for the subtraction domain appears to be a nested hierarchy with number size as the most important structural characteristic influencing difficulty level, and box position as the next most important, followed by the problem format. Subtraction items featuring big numbers with a box first structure and a number format combine the most difficult possible variations of structure for our Year 4 sample. In the case of addition items, word format and box first position combine the most difficult possible structural variations.

Some items posed specific conceptual difficulties for students and prompted specific error responses. This is true especially for items involving the subtraction of zero, concepts items, and some word items. Items involving the subtraction of zero had a majority of errors in the "zero response" category (170 children made this response to ☐ = 5-1, which is 88% of all those who made any error response). The concept of zero still eludes at least 20% of the sample.

Responses to the fraction items indicated that fractions are either not taught or not understood at Year 4 level. The sample tended to make one of two error responses - either operates on the fractions denominator as though it were an integer (8% of all respondents who made errors); or substitutes fractions/gives denominator or numerator as answer/leaves blank (66% of respondents who made errors).

The equivalent expressions items had a majority of errors in the "ignores extra terms" category. This response indicates that the children interpreted the equation sign as meaning "results in" or "makes" and hence read a sentence like ☐ + 4 = 12 - 5 as "something plus 4 makes 12." A cognitive theory explanation for this interpretation is that children of this age tend to resist the inclusion of more than three elements in a number sentence, and preserve the usual pattern of performing an operation on two elements to obtain a third single element (Collis and Biggs 1979).

The error responses to the missing sign items indicated a similar inertia among a group of at least thirty children. This group replaced the missing sign with a number. The majority of the sample however, demonstrated competence at solving such problems.

SUMMARY

The maths investigation's findings related to its three aims were:

(1) significant achievement differences exist between subsamples and many schools on all subscales and on the total test. The Mt Druitt subsample was shown to be homogeneous in terms of achievement and significantly different to the Contrast group. School differences emerged between pairs of schools from different subsamples. No sex differences were found.

(2) longitudinal change in performance was found on the 11 items common to the 1981 and 1982 tests. Both negative and positive change had occurred.

(3) sample-wide error patterns emerged from the data. Most of these patterns reflect rational attempts at maths problem solving. Three structural elements of maths problems were found to influence item difficulty: box position, problem format and number size. Their influence suggests a hierarchy of difficulty among items. Some error responses identified cognitive difficulties posed by particular structures.

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A LONGITUDINAL STUDY OF CHILD GROWTH AND DEVELOPMENT AND THE INCIDENCE OF PHYSICAL DEFECTS AT AGES 9 and 10.

Introduction

Relationships between indices of physical growth (themselves indices of nutritional status and general well being) and factors such as socio-economic status, developmental measures such as intelligence, and school achievement measures have been reported consistently since the beginning of this century. Abernethy (1936) concluded that 'despite differences in criteria, techniques and methods of analysis, the general trend of results indicates that the mental and physical measurements of children are, to some extent, positively related'. Whipple (1914) had suggested that the relationship between physical and mental measurements was largely a question of relative maturity, that is, the relationship should weaken with increasing age and disappear altogether in the adult population, but Shuttleworth's (1939) detailed study of the relationship between mental growth and the age at maximum growth rate (age at maximum growth rate being the most accurate indicator of relative maturity) found no greater relationship than between the actual measurements of physical and mental growth. He did, however, find that the relationship decreased with increasing age.

More recent investigations have reported the same basic findings and sophisticated multivariate techniques are being used to further explore the relationships. Eight co-ordinated international studies (London, Paris, Stockholm, Zurich, Brussels, Dakar and Kampala) linked through the International Children's Centre, Paris, have been collecting data on all aspects of child development since 1955. A special issue of Courrier (30,1980), dedicated to the XVI International Congress of Paediatrics, Barcelona, reports on these studies up to that time. Although the data exist, the relationships of psychological factors and states to somatic growth remain unreported.

Birkbeck, Guthrie and Herbert (1980) report positive univariate relationships between anthropometric and school achievement measures for their Dunedin (New Zealand) Multidisciplinary Child Development Study (data on approximately 900 children from birth to 10 years of age and still being collected) but, once again, the multivariate analyses are incomplete and yet to be reported.

Similar data are not yet available for a large sample of contemporary Australian children. Cross-sectional anthropometric data for Australian children have been published by State Health Departments (eg Jones, Hemphill and Meyers 1973) but growth velocity and the relationship between anthropometric measures and other aspects of development have not been reported. The National Health and Medical Research Council of Australia is currently investigating the exact extent of existing anthropometric data for the Australian population with a view to identifying and perhaps remedying any gaps.

A thorough review of the relevant literature will not be attempted here. The volume of entries in Index Medicus every month is indicative of the immense universal interest currently being sustained by child growth and development and the factors which influence it. Research is being reported from many different countries; Moyes (1976) in St Helena; Karlberg, Taranger, Engstrom, Karlberg, Landsterom, Lichtenstein, Lindstrom and Svennberg-Redegren (1976) in Scandanivia; Buzina (1976) in Yugoslavia; Johnston, Wainer and Thissen et al (1976) in Guatemala; Motajova, (1976) in Czechoslovakia; Mularczyk-Bal (1975) in Poland; Khamaganova and Uvarova (1981) in Russia; Banik (1982) in India; and, Spurr, Reina and Barac-Niets (1983) in Columbia, to list but a few. The titles of studies indicate great concern about the relative influence of genetic and environmental factors. Specifically, many studies have investigated growth rates in contrasting socioeconomic groups (Baertl, Adrianzen and Graham, 1976; Johnston et al, 1976; Christiansen, 1975; Rona, 1981; Panto, 1982; Banik, 1982).

Relationships between socio-economic status and anthropometric measures have also been reported in Australia. Jones et al, (1973) included a sample of Child Welfare Department charges in residential care, as representatives of "underprivileged" children to compare with their main norming sample. They found the underprivileged group to be shorter at all ages than the main Sydney sample. Hitchcock and Gracey (1980) in a study of diet and nutrient intake in relation to socio-economic status in Western Australian children found that boys but not girls in their higher socio-economic status group were significantly taller than those in the lower socio-economic status group. They did not, however, find any differences between the two groups in either the quantity or quality of the foods eaten, but suggested that their sample did not include any children from families with incomes at or below the poverty line.

A detailed survey by Stuckey and Darnton-Hill (1980) of the dietary intakes of a randomly selected subsample of the Mt Druitt Early Childhood Project Sample (Braithwaite, 1983) found that at five years of age most intakes were above the NHMRC Recommended Daily Allowances, particularly with respect to energy. They expressed concern, however, that one third of the children appeared to have low intakes of at least one nutrient. The dearth of Australian information precludes comparison of these findings with those for other contrast groups in the community, or indeed with the non-Mt Druitt Contrast Schools in the present study. Available information would suggest that few, if any of the children in the present study are actually undernourished; isolated instances of children without lunches have alerted teachers to the possibility that a small number may be.

Pollitt, Mueller and Leibel (1982) suggested that in undernourished populations height is more dependent on socioeconomic status and less on expression of genetic potential than is the case in well-nourished populations. Tanner (1969, 1978) concluded that in the school-age period height and physiological maturity are positively related to measures of intelligence and school achievement even after controlling for socioeconomic status.

Increases during the twentieth century in the mean height and weight of adult populations and of groups of children of specified ages have generally been attributed to improved standards of living and of nutrition in particular. Whether such explanations can be extended to cover observed differences in the anthropometric characteristics for subgroups of a given population remains uncertain. Differential rates of growth, irrespective of gains in absolute terms, need to be considered when interpreting differences observed in groups of children. The possibility that rates of physical and mental growth are related cannot be dismissed and provides the rationale for an educational research project including a study of physical growth.

The aims of this Growth and Development study are to obtain longitudinal data on the physical growth and development of, and the incidence of defects in a group of Australian children and to examine the relationships between these data and a range of other developmental and educational factors. A recent Tasmanian Education Department investigation, for example, claimed that 70 per cent of the children studied had at least one minor physical impairment and that in many cases this could affect progress in school.

The specific questions addressed by this study are:

- do groups of children from different socio-economic backgrounds differ significantly in terms of their anthropometric measurements?

- what are the incidence rates for physical defects in 9 year olds?
- do groups of children from different socio-economic backgrounds differ significantly in terms of the incidence of physical defects (visual, auditory, orthopaedic, congenital, neurological)?
- are the observed differences in school achievement levels and IQ related in any way to differences in anthropometric measurements?
- is the incidence of physical defects associated with lowered school achievement levels?
- has there been a further increase in the stature and weight of nine and ten year old Australians since the currently used Australian normative data was collected in 1970?

This study forms part of the Mt Druitt Longitudinal Study (MDLS) which was attempting to delineate how "disadvantage" functioned for Australian children. Included in the MDLS sample were children, for example, from relative poverty or from single parent families or of Aboriginal descent or of migrant backgrounds, as well as children from advantaged circumstances. Identification of any relationships with academic performance or affective development of any other characteristics of the children, or their families was of importance if children's academic and personal growth were to be maximised.

Method

The MDLS sample comprises some 900 children who are now aged between ten and eleven years of age. A subset of these children were part of the sample of the Mt Druitt Early Childhood Project (MDECP) in their preschool year in 1977. A further subset became part of the MDECP in 1978 (when they enrolled in Kindergarten) as a control group who had not attended a preschool. The remainder joined the MDLS sample in 1981 (in Year 3 of their schooling) when all Year 3 children in the five Mt Druitt area schools having MDECP subjects, and all Year 3 children in three other Sydney schools (selected on the basis of the geographical and socio economic characteristics of their feeder zones which contrasted sharply with the Mt Druitt area) were included in the study (see Table 1).

The New South Wales Health Commission is represented on the MDLS Steering Committee by an officer from its Western Metropolitan Region. The anthropometric data reported here were obtained as part of a co-operative undertaking by the Macquarie University MDLS team and staff of the New South Wales Health Commission's Western Metropolitan Region (Sydney) made available for the duration of the data collection. The other aspect of the joint undertaking was a thorough health screening. The MDLS sample in one Contrast School and five Mt Druitt Schools, all located within the Health Commission's Western Metropolitan region was examined by a team of nurses and doctors during February and March 1982. The findings of the screening component have already been reported at a Health Commission Conference (Haskard, Belfer and Rosley 1983) and all defects identified by the screening have been followed up. This document reports the basic anthropometric findings, the incidence of defects, and the relationships between the anthropometric measures and defects on the one hand, and background factors such as socio-economic status, developmental measures such as intelligence and school achievement measures such as Maths and Reading, on the other.

The Sample

The majority of the MDLS sample in each of the five Mt Druitt area schools and Contrast School 1 were measured and assessed in March/April 1982 and measured again in March/April 1983. Children at Contrast Schools 2 and 3 were measured in March/April 1983 only. Contrasts 1 and 2 are in much higher socio-economic status areas than Mt Druitt, with Contrast 3 falling between Mt Druitt and Contrasts 1 and 2. They also differ in geographical location (see Table 1). Achievement and IQ were assessed at each School during 1982.

Table 1: Characteristics of Sample Schools' Catchment Areas

School	Socio-Economic Status	Geographic Location
Mt Druitt	Low	Outer City/Semi Rural
Contrast 1	High	Outer City/Semi Rural
Contrast 2	High	Inner City
Contrast 3	Medium	Inner City

In any grade cohort, a proportion of the children are outside the age range expected for that grade either because they did not enrol at school as soon as they were legally entitled or because they have repeated a grade at some stage. Only those children with ages falling within the expected twelve month range (8 years 8 months to 9 years 8 months as at 31.3.82) were included in the sample as shown in Table 2.

Table 2: Numbers in each sample group

Grade	$\bar{X}$ Age in years	Group				
		Sex	Mt Druitt Area (5 Schools)	Contrast Schools		
				1	2	3
4	9.25	M	191	30	-	-
		F	199	39	-	-
5	10.25	M	120	29	30	17
		F	138	30	32	22

The Measures

1. Anthropometric Measures:

    a) Stature: All heights were measured to the nearest millimetre (by the same person using the one instrument, a Seca stadiometer).

    b) Weight: All weights were measured to the nearest 0.1 kg (by the same person using the one instrument, a Seca beam balance). Children removed all heavy items of clothing before being weighed.

c) **Occipito Frontal Circumference:**

A flexible fibreglass tape was placed around the head touching the occipital protruberance at the back and a point on the forehead approximately 2 cms above the supra-orbital ridge, commencing at the 10 cm mark on the tape and subtracting 10 cm from the reading.

d) **Left Upper Arm Circumference:**

A flexible fibreglass tape was placed around the upper arm at a point halfway between the olecranon and the acromion, commencing at the 10 cm mark and subtracting 10 cm from the reading.

e) External male genitalia in boys and breast development in girls were assessed using the photographs and descriptions for Tanner's Scale (Forfar and Arneill, 1973) giving a 'score' from 1 to 5.

f) Pubic Hair growth in boys and girls was assessed using photographs and descriptions for Tanner's 5 point scale.

2. Socio-Economic Index:

Father's education, measured on a nine point scale from '9', primary education only through to '1', postgraduate university education, correlating with mother's education (.5 for Mt Druitt and .7 for Contrast School 1) and father's occupation measured on a 16 point scale from '1', high status to '16' low status (correlating .4 for Mt Druitt and .5 for Contrast School 1) was selected to represent socio-economic status.

3. School Achievement Measures:

a) Word Knowledge	ACER Level B form R
b) Comprehension	ACER Level B Form R
c) Mathematics	Mt Druitt Longitudinal Study Measure

4. Intellectual Development Measure:

IQ was measured using the TOLA 4 at all Schools except for one of the Mt Druitt Schools which used the Primary Mental Abilities test.

5. Physical Defects: (Full description of assessment procedures and definitions included in Appendix B).

a) Vision
b) Hearing
c) Blood pressure
d) Orthopaedic defects

e) Congenital defects
f) Neurological defects
g) Speech defects

The Community Nurse at each of the six schools was responsible for head and arm measurements, and vision and hearing assessment.

Four medical practitioners provided by the Western Metropolitan Region of the N.S.W. Health Commission were responsible for measures of sexual development, speech defects, blood pressure, orthopaedic, congenital and neurological defects.

School Counsellors provided the IQ scores from their routine Grade 4 testing program.

Stature, weight and school achievement measurements were carried out by MDLS research assistants.

Data Analysis

Anthropometric measures taken on two occasions twelve months apart for two groups and on a single occasion only for two other groups are reported as means and standard deviations for each group for each occasion for males and females separately. Mean ages for each group are reported.

Differences between groups and sexes were tested for significance by multivariate analysis of variance. Height and weight velocities in cms/yr and kg/yr respectively were calculated for each child and mean velocities reported for each group. Univariate correlations amongst the anthropometric measures are reported for two ages.

Descriptive statistics are provided for sexual development measures and for all health screening variables. Mean achievement levels for groups of children with a particular defect are compared with the relevant overall group means.

Relationships between achievement levels and stage of sexual development could not be investigated adequately due to the small number of cases at the more mature levels of development.

Multivariate regression was used to examine the relationships between anthropometric measures, father's education, age, school achievement and IQ.

The anthropometric statistics are compared with Australian norms based on data collected in 1970.

Results

1. Anthropometric Measures

The mean height of the male sample in 1982 was 1356mm, the Mt Druitt boys averaging 1354mm and the Contrast School boys averaging 1371mm. A year later the mean heights for these three groups were 1432mm, 1423mm and 1438mm.

The girls mean height in 1982 was 1348mm, with the Mt Druitt girls averaging 1341mm and the Contrast School girls averaging 1479mm. In 1983 the mean heights were 1429mm, 1415mm and 1447mm respectively.

In 1981 the total sample of boys had a mean weight of 30.1kg, with the Contrast School boys, 30.8kg, being slightly heavier than the Mt Druitt boys who averaged 29.9kg. A year later the mean weights had increased to 34.2kg, 34.7kg and 33.3kg respectively.

The girls mean weight in 1982 was 29.9kg, with the Mt Druitt girls weighing less on average, at 29.5kg, than the Contrast School girls at 31.7kg. In 1983 the mean weights had risen to 34.0kg, 32.6kg and 35.0kg resepectively.

Table 3: Height and Weight Velocity across 12 month period from mean age 9.25 years to mean age 10.25 years

		Mt Druitt			Contrast 1		
		$\bar{X}$	n	sd	$\bar{X}$	n	sd
Height (cm)							
	Males	6.6	106	1.0	6.5	27	1.0
	Females	7.2	129	1.6	7.4	29	1.1
	Total	6.9	235	1.4	6.9	56	1.2
Weight (kgs)							
	Males	3.5	106	2.3	3.1	26	1.1
	Females	3.6	128	2.2	3.8	29	1.6
	Total	3.6	234	2.2	3.4	55	1.4

Multivariate Analysis of Variance of Anthropometric Measures

a) At age 9.25 years.

Height, weight, head circumference and upper left arm circumference were analysed by group (Mt Druitt and Contrast 1) and sex while covarying for age. The design was unbalanced (unequal cell frequencies) so the analysis was executed to correct each term for every other term in the model.

As anticipated, age was a significant source of variation in height (p = .000) and weight (p = .038) confirming the need for its inclusion as a covariate. The group means for age, however, did not differ significantly. There was no significant interaction between group and sex. The contrast group was significantly taller, heavier and had larger head circumferences than the Mt Druitt group. Boys had significantly larger head circumferences than girls while the reverse was true for upper left arm circumference.

b) At age 10.25 years

The multivariate analysis of variance was repeated for the same measures made twelve months later. On this occasion two additional sets of contrast figures were available. Contrast 3 was not included due to the ethnic heterogeneity of the sample, which contained a large number of Greek/Australian children. Jones et al (1973) report that Southern European migrants were on the whole shorter than Australians of at least second generation. (Contrast 1 and Contrast 2 were combined for the purpose of this analysis.)

Once again, the Contrast group was significantly taller, heavier and had larger head circumferences than the Mt Druitt group. Boys had significantly larger head circumferences than girls but the previously observed sex difference in upper left arm circumference had disappeared.

Table 4: Comparison with Australian Anthropometric Norms - differences between males and females for height and weight

	Age last birthday			
	8	9	10	11
Height (Males - females) **(cms)**				
NSW Health Dept 1970	+1.03	+1.00	+0.36	-1.72
MDLS 1982/83	***	+0.64	+0.07	***
Weight (Males-females) **(kgs)**				
NSW Health Dept 1970	+0.55	+0.26	+0.14	-1.83
MDLS 1982/83	***	+0.75	+0.66	***

*** Not available

The MDLS sample was never intended to be representative of the Australian population and would tend to give underestimates of true measurements due to over-representation of the lower socio-economic groups. The increases in mean height at ages nine and ten between 1970 and 1982/83 can therefore be taken as a conservative estimate of the true increase. The age at onset of the pubescent growth spurt would appear to be decreasing given the age at which the mean female height temporarily overtakes the mean male height (see Table 16) and the amounts by which the MDLS mean heights are greater than the 1970 norms i.e. the difference for age 10 is twice as great as it was for age 9. Given the height velocities shown in Table 8 the increase in height represents approximately 7 to 8 months in age.

Sexual Development

Sexual development was assessed by a team of medical practitioners using Tanner's five point scales for development of male genitalia, female breasts and pubic hair growth.

Only children aged between 8 years 8 months and 9 years 8 months at time of assessment were included in this analysis. The percentage of the group of children in the grade but beyond these age limits i.e. older than the selected sample due to repeating or late starting, who were pre-pubescent was greater than that of the total sample but similar to that of the Mt Druitt Subgroup. Eighty seven percent of the older boys and 78 percent of the older girls were assessed as level 1 on Tanner's Scale of sexual development. It would appear that children who have repeated a grade, presumably because they were not coping with their schoolwork, may also be slow to develop physically.

Table 5: Percentages of males and females in the Mt Druitt and Contrast 1 subgroups at each level of sexual development

SEXUAL DEVELOPMENT (Tanner's Scale)	MALES		FEMALES	
	MT DRUITT n = 189	CONTRAST 1 n = 30	MT DRUITT n = 194	CONTRAST 1 n = 39
1	90.5	23.3	84.5	38.5
2	9.5	53.3	12.4	56.4
3	0	23.3	2.6	5.1
4	0	0	.5	0

The majority of children (97.7% of males, 94.9% of females) were still at level 1 in terms of growth of pubic hair. Only 5 males (all in the Mt Druitt group) and 11 females (a similar proportion coming from each subgroup) were classified as level 2 and one Mt Druitt female was level 3.

One girl had commenced menstruation.

5. Health Screening - Physical Defects

a) Vision

Glasses were already being used by 5.6% of the children. Australian Bureau of Statistics (1979) reports 3.4% of 5-9 year olds and 6.6% of 10-14 year olds wear glasses. Two children were assessed as having defects which could not be corrected and six children with defective sight were found to be wearing either inadequate glasses or no glasses at all.

All children were tested without glasses. Those with glasses were retested wearing their glasses.

When tested without glasses 92.5% of children had 6/6 vision in the right eye and 92.1% had 6/6 vision in the left eye. Of the 600 children, 574 did not wear glasses.

b) Hearing

Each ear was tested for high and low frequency hearing loss. There was a slightly greater percentage suffering low frequency loss than there was for high frequency loss. Percentages for right ear loss were slightly lower than for left ear loss.

In the right ear 97.2% had no hearing loss in the high frequency range while 95.3% had no hearing loss in the low frequencies. For the left ear the respective percentages were 96.3% and 94.6%.

Table 6: Percentages suffering hearing losses.
n = 574

Degree of loss	Right Ear		Left Ear	
	High Freq.	Low Freq.	High Freq.	Low Freq.
None	97.2	95.3	96.3	94.6
Mild	1.7	3.1	2.3	3.8
Moderate	.9	1.2	.9	1.0
Severe	.2	.3	.5	.5

At the same time 3.8% were found to have an ear infection.

c) Blood Pressure

Children with systolic blood pressure above 110 mmHg or diastolic pressures below 70 were classified as having a mild disability. Thirteen of the 22 children thus classified were from the same school. Subsequent retesting resulted in normal readings in all but two cases. Due to this lack of reliability of the readings the figures given in Table 7 should be interpreted with caution.

Table 7: Distribution of Blood Pressure Measures

	N	$\overline{X}$	sd	Minimum	Maximum
Systolic	561	95.5	9.7	66	125
Diastolic	561	60.4	7.9	30	85

d) Orthopaedic Defects

Fifty children were assessed as having a mild orthopaedic disability, one moderate and one severe. Although 52 (9.2% of the sample) had defects, 33 (63%) of them did not warrant treatment of any kind. Eleven children (21% of those with a disability, 2% of total sample) were found to be in need of treatment. A further four were already being treated, two had completed treatment and two had conditions not amenable to treatment.

e) Congenital Defects

Seventy children (12.3% of the sample) had mild (59), moderate (7) or severe (4) congenital defects. More than half of these (54%) required no treatment, ten (14%) had already completed treatment, five (7%) were currently being treated, five (7%) could not be treated and 18 (26%) were in need of treatment.

There were no instances of paresis and only two cases of cerebral palsy (.4% of sample).

f) Speech Defects

The several aspects of speech assessed can be broadly classified as the language aspects and the physical aspects of speech production.

Table 8: Percentages of Physcial Defects related to Speech Production

Problem	Total Sample n = 575	Mt Druitt n = 502	Contrast 1 n = 73
Articulation	19.1	20.13	10.9
Oro-muscular	2.4	2.2	4.1
Voice disorder	4.8	4.1	9.6
Fluency	2.1	2.4	0.0

Table 9: Percentages of Language Defects

Problem	Total Sample n = 575	Mt Druitt n = 502	Contrast 1 n =73
Comprehension			
Mild	16.2	18.0	4.1
Significant	6.5	7.5	0.0
Total	22.7	25.5	4.1
Expression			
Mild	16.5	16.9	13.7
Moderate	15.4	16.9	5.5
Severe	3.4	3.3	4.1
Total	35.3	37.1	23.3

The majority of children with physical speech problems had no language problems at all or a mild expressive language problem only.

Half of the children with a moderate or severe expressive language problem did not have a comprehension problem but only a quarter of the children described as having a significant comprehension problem had no expressive language problem.

Approximately 8% of the sample (45 children) had physical speech defects, some children having more than one of the listed problems.

Approximately 35% of the sample (200 children) had language defects (comprehension and or expression). The overall assessment indicated that 37% (196 children) were in need of treatment, the majority for language rather than physical problems. Baker's (1982) summary of the speech data for the Health Commission indicates low reliability of the data.

g) Multiple Defects

A small number of children suffer from more than one of the defects listed e.g. one third of the congenitally defective have orthopaedic defects and half of the orthopaedically defective have congenital defects (24 children suffer from both). A few children with hearing loss or physical speech problems have other congenital and/or orthopaedic defects as well.

h) Value of the Health Screening

Quite apart from providing data of academic interest about rates of occurrence of a variety of defects, thirty two children requiring treatment were identified as a result of this screening and are now receiving appropriate treatment. A further 196 have been identified as requiring help with a speech problem and these children will be followed up in due course.

Table 10: Children identified as requiring treatment

Defect	Number Requiring Treatment
Vision	6
Orthopaedic	11
Congenital	18*
Speech	196

* includes 3 children who also require treatment for an orthopaedic defect.

6. Relationships between School Achievement and Physical Development

a) Sexual Development

The relationship between school achievement and level of sexual development could not be examined statistically due to the small numbers in the higher levels of sexual development. Level of sexual development was not entered as a variable in the multivariate regression along with the other anthropometric measures because the data was categorical.

b) Relationships between Physical Defects and School Achievement

The mean achievement scores for Word Knowledge, Comprehension and Maths were calculated for each group of children suffering from a particular defect. In the case of vision only those children with uncorrected or unable to be corrected vision defects were included. The hearing defective group includes those with a moderate or severe hearing loss of upper and/or lower frequencies in either or both ears.

Table 11: Achievement Means for Groups of Children with Specific Physical Defects

GROUP	N	Word Knowledge $\overline{X}$	Word Knowledge sd	Comprehension $\overline{X}$	Comprehension sd	Maths $\overline{X}$	Maths sd
All Mt Druitt Schools and Contrast 1	538	20.58	7.86	18.20	6.86	48.64	15.69
All Mt Druitt Schools	458	19.22	7.96	16.95	7.01	46.[illegible]	15.28
Speech Disorders	83	16.89	8.35	15.69	7.49	43.24	16.02
Visually Defective	8	22.75	9.63	18.14	7.97	52.88	10.47
Hearing Impaired	14	18.27	8.19	17.73	8.68	46.08	16.86
Congenital Defects	28	17.54	9.09	16.24	8.40	42.46	16.03
Abnormal Blood Pressure	22	21.80	9.7	18.81	8.51	48.84	17.19
Orthopaedic Defects	14	17.93	7.90	15.38	7.24	42.14	15.43

The speech defects group alone appears to be achieving at lower levels than the total group. All other groups suffering physical defects include children across the full range of achievement levels.

c) School Achievement, IQ, Height, Age and Father's Education

The relationships amongst this set of variables were investigated through multivariate regression analysis using the Statistical Package for the Social Sciences (Hull and Nie, 1981). As there was a large difference between the achievement levels of the Mt Druitt group compared with Contrast School 1 the analysis was performed separately for the Mt Druitt sample as well as for the combined sample (Mt Druitt and Contrast School 1). This method of analysis was used to provide information about the patterns of interdependence between two sets of variables, the number of statistically significant links between the sets and the extent to which the variance in one set is redundant, given the other set. For convenience, one set is referred to as the dependent variables and the other as the independent variables.

The independent variables were height, age and father's education level; interactions between height and age and height and father's occupation were included in the design. The dependent variables were mathematics, word knowledge and IQ Scores. The analysis for Mt Druitt alone produced essentially the same results (with reduced percentages of variance explained) as was obtained for the combined sample thus validating the use of the composite group.

Four multivariate tests of significance (Pillais, Hotellings, Wilks and Roys) all gave F values significant at the .000 level for both groups (for the combined sample Wilks Lambda = .6865, F = 5.914 (15,608)).

Two linear combinations of each set of variables selected so that the correlation between the corresponding linear combinations from each set would be maximised, were significantly related.

The first linear combination (canonical variable) of the dependent variables (representing 65.7% of the variance in the original variables) could be described as the 'ability component' of achievement and IQ, determined largely by genetic and/or family environmental factors. The second (representing 22.6% of the variance in the original variables) could be described as that component of achievement resulting from schooling effects. The negative relationship between IQ and the first canonical variable in the Mt Druitt analysis is most probably a statistical artefact resulting from the restricted distribution of IQ scores in that sample. The distribution of IQ scores for the combined sample more closely approximates the distribution for the population in general. If the above interpretation of the canonical variables is correct, it would appear that schools have a greater impact on IQ in areas such as Mt Druitt than they can hope to have in more advantaged areas, i.e. IQ for the Mt Druitt group is less closely related to family background characteristics.

These two canonical variables of the dependent variables account for a total of 17.79% of the variance in the independent variables.

The two canonical variables of the independent variables, (representing 32.6% and 39.7% of the variance in the original variables) with height, age and father's education all significantly represented, account for a total of 11.51% of the variance in the dependent variables.

Thus a small but significant part of the variation in IQ and school achievement can be explained in terms of age, height and father's education.

Discussion

The incidence of physical defects, visual, auditory, orthopaedic, congenital and neurological, is no greater within an economically disadvantaged group than it is in a more advantaged group. Nor are such defects associated with lower levels of school achievement. In the absence of normative data for the occurrence of physical defects in Australian children, no assessment can be made of the absolute levels of incidence.

At the individual level the health screening component of this study was well worth the effort. Detected defects have been or are being treated and the statement made by the mother of a girl discovered to be suffering from scoliosis that "early detection and subsequent treatment has prevented my daughter from becoming a cripple for life" clearly illustrates the value of the screening.

The significant differences in the mean height, weight and head circumference of the Mt Druitt children compared with a more advantaged group of children are cause for concern. Given that comparable differences would not be expected in the adult population, such differences must be interpreted as reflecting different rates of development. That physical growth rates are subject to environmental influences in less than optimally nourished populations is well established. The increase in mean height for both males and females at ages nine and ten years over the past twelve years can only be the result of environmental factors. There are strong indications that the observed differences between the two groups do indeed represent differential rates of development. The mean height of the advantaged girls, for example, surpassed that for advantaged boys sooner than was the case in the disadvantaged group.

The aetiology of the variation in growth rates for these two groups can only be the subject of speculation at this stage. The existence of genetic determinants cannot be ruled out and the evidence for the existence and effect of nutritional and/or emotional differences in advantaged and disadvantaged environments in Australia is yet to be demonstrated. The disadvantaged group could not be described as malnourished in absolute terms but may be relatively less well nourished than the advantaged group. The concurrent differences in IQ and school achievement between the two groups and the explanation of 12% of the variance in such measures by means of relations with height, father's education and age points to parallel differential rates of intellectual development. Optimal physical and mental growth may be associated via the common process of physiological maturation.

A major difficulty in seeking direct relationships between height and other variables is the inability to allow for differences in final mature height, which in part at least is genetically determined and is expected to be normally distributed. It is one thing to compare the mean heights for two groups, assuming the final height variation to be similarly distributed in each group, but quite a different matter to compare an individual's height and say, school achievement. It is not being suggested that 'tall people *per se* are smarter' but that children relatively closer to their mature height at a given age may also be relatively more intellectually mature than other children of the same age. Inability to covary for final mature height is possibly responsible for the relatively small correlations (usually .2 to .3) obtained between school achievement and height.

The findings of this study do, however, support Tanner's claim that height and educational achievement are positively related within each socioeconomic group. Pollitt *et al.* (1982) claim that weight-for-height is a more appropriate indicator of advanced physical maturation if the population under investigation is well nourished. The positive relationship between physical maturation and school achievement was confirmed yet again in Pollitt's well nourished sample, giving credence to the hereditary explanation of differential rates of development.

The existence of differential rates of intellectual development, regardless of whether genetically or environmentally determined, raises serious questions about educational practices which group children according to chronological age. The outcomes of slower rates of development, in the form of lower test scores, serve to accentuate the differences and may through such mechanisms as lowered self esteem, operate to lower the final level of intellectual development attained.

Given that the retardation in rate of physical development of the Mt Druitt group is of sufficient magnitude to produce a mean difference of 2 to 3 cms in height between advantaged and disadvantaged groups by 9 years of age, governments should be concerned about the possibility that environmental factors may be responsible. The provision of physically adequate housing may be insufficient if nutritional and emotional deficiencies claimed to be associated with relative poverty can undermine efforts to provide equal educational opportunities for all children.

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"GETTING ON WITH IT" : CLASSROOM DISRUPTION IN THE PRIMARY GRADES.

Introduction

Low-income background children have been commonly identified as more disruptive in the classroom than children from less disadvantaged backgrounds; this is a widespread view. In the United States, for example, Harvey (1980:282) noted that "the low income child is supposed to be noisier and more physically aggressive than high income peers "although her own observation in classrooms did not support such claims. Across the Atlantic, Little (1971:65), in Britain, suggested that the "picture of the inner-city (low income) school as being more difficult to teach and learn in than the (higher income) counterpart" was conveyed by the literature although he noted that most of this writing was anecdotal and impressionistic.

In N.S.W. discussions with educators in the Mt. Druitt primary schools, located some thirty five to forty five kilometres to the west of the business centre of Sydney, serving a population drawn in the main from State Government provided housing, had led to the identification of classroom disruption as a worrying problem in these "disadvantaged" Primary School settings.

It has been hypothesised that a basis for greater disruption amongst low-income children may lie in the greater personality disturbance they are assumed to suffer (e.g. Brophy and Putnam, 1980:185) or in the greater maladjustment assumed to be present in such populations (e.g. Little, 1971:66). Such pyschological conditions have been assumed by some to lead directly to disruptive behaviour in the classroom, although an indirect linkage, via educational failure, was suggested by Little (1971:66) who saw failure preceding and giving rise to classroom misbehaviour but succeeding maladjustment. The view of the low-income background child from this personality deficit perspective suggests that they are impulsive and out of their own or their teacher's control, having failed to adopt behaviour necessary for adjusted living in the complex, social world of the schoolroom.

On the other hand explanations for the supposed greater disturbance in low income classrooms may focus on the school as an institution and attempt to highlight deficits either in public policy held for schools, or in persuasive educational perspectives, or in the educational practices adopted by the school with low income children, rather than identifying deficits in children. Others (e.g. Brophy and Putnam, 1978:8) suggest that the failure to provide classrooms either low in, or free of, disruption rests within the teachers' lack of skill in being able to avoid or handle classroom disruption. Such views would suggest the need both for changes in the educational philosophies of schools and teachers and for additional teacher training to help change the practices which prevail in classrooms rather than seeking the changes in pupils or in their families suggested by pupil deficit views.

A disruptive incident, for the purposes of the study reported here, is a sequence of behaviour involving both the pupil/s and the teacher: a child, group of children or the class behaves in such a way that class order breaks down and the teacher responds with the intention of restoring order. In the disruptive incident the actual pupil behaviours identified as disruptive have been associated into a variety of classes of misbehaviour (e.g. Quay, 1977; Rohrkemper and Brophy, 1980;

Mattaliano, 1980) which fall generally into two broad groupings; conduct-disordered or personality-disordered behaviour.

It has been suggested that the conduct disorder group of behaviours include such activities as physical and verbal aggression, talking to peer, movement and inattention, whilst personality disorder behaviour such as under-achieving or low achieving, withdrawal, rejection and failure syndrome have been included in operational definitions.

As personality disorders may manifest themselves as a retreat from the classroom rather than an intrusion upon it, it is the conduct disorder behaviours which are identified generally as disruptive for, as Quay (1977:9) suggests, "a child ... consistently manifesting these characteristics is almost certain to be at odds with the expectations of most behaviour settings".

Observational research into classroom disruption has demonstrated clearly that pupil misbehaviour and teacher response to it can be observed validly and reliably. Few researchers, however, have set out to observe more than two or three pupil misbehaviours, of the scores of possibilities, while teacher response to pupil misbehaviour has been operationalised typically in observational research into a narrow range of behavioural categories (e.g. Jones and Eimers, 1975; Lavergne, 1981). From this research, however, it has been demonstrated that teacher behaviour contingent upon categories of pupil misbehaviour can be varied systematically (e.g. Harris and Sherman, 1973; Borg and Ascione, 1979) and that pupil behaviours such as attention to task and productivity will vary in relation to manipulated teacher behaviours (e.g. Jones and Miller, 1974; Jones and Eimers, 1975). It is also possible to extract from reports of observation of classroom disruption a measure of the rate of occurrence of disruption in normal primary school classrooms. While such extraction is not a straightforward matter, in that deduction and extrapolation play a role in calculating a rate measure from several studies, such a measure and knowledge of most common rates could help in a consideration of the validity of suggestions that disadvantaged, or low-income, youngsters are to be found in classrooms suffering greater disruption to lessons than is the case with their higher income counterparts From the seven studies identified (Thomas, Becker, Armstrong, 1968; Harris and Sherman, 1973, Solomon and Kendall, 1975; White, 1975; Bossert, 1977; Jones, Freemouw and Carples, 1977; Behnke, Bennett, Chase, Day, Lazar, Mittleholtz, 1979) which either reported a rate of occurrence measure directly or permitted a deduction of a rate measure a total of 18 rate measures were found; the mean rate was 15.67 disruptions per thirty minutes (S.D. = 14.8) although no most common rate could be identified within the wide range of scores. Rates of occurrence as low as 1.95 disruptive incidents per 30 minutes (Bossert, 1977) and as high as 50.4 disruptions per 30 minutes (Harris and Sherman, 1972) have been reported. Only one (Jones, Freemouw and Carples, 1977) of the studies included low income background children in the sample, the limited research thus permitting identification of no general or common level of disruption in low income classrooms. These studies give little guidance as to what might be expected when classes in the Mt. Druitt schools were observed.

Variations in disruption rates have been identified in relation to the grade level of pupils being observed. Brophy and Evertson (1979) identified four stages within the age span of the Infants' and Primary School child at which different types of pupil disruption may occur and different goals and techniques for teacher management may be implied. The second of the stages occurs in the middle grades of Primary School, at a time when "the need to stress classroom management is reduced, and teachers can concentrate on instructing children in the formal curriculum". This stage continues, it was suggested, while the majority of students view the teacher as the legitimate source of authority and see their role as fulfilling the requests of their teacher. Evidence gathered from interviews with Mt. Druitt children during their Third Grade year suggested that this was exactly their view of the world of school (Almy, with O'Brien, Butorac and Clark, 1981). Behnke, Bennett, Chase, Day, Lazar and Mittleholtz (1979:4) provide data, gathered in classrooms at four grade levels from Kindergarten to Third, which support the conclusion that the middle primary school grades may be less disrupted than earlier grades for they found greater preservation of instruction time free of disruption as grade level increased. On the other hand Harris and Sherman (1973) report higher levels of disruption in the Fourth and Fifth Grade classrooms observed in that study than were reported in any of the other six identified studies, while White (1975) reported data indicating no change in the rate of disruption observed in classes ranging across all grade levels from First to Sixth. Again, little guidance in the formation of expectations for what might be found in Mt. Druitt classrooms could be gleaned from the equivocal findings of the set of identified studies.

A thorough review of the Australian educational literature led to the identification of a large set of exhortatory articles but of no systematic study of disruption in Australian classrooms. Investigation of the occurrence of disruption in the Mt. Druitt classrooms and identification both of any linkages between disruption and pupil socio-ecnomic status or grade level or with teacher management appeared useful as findings could increase the understanding of the dynamics of "disadvantage" and influence educational policy, and preservice and inservice teacher education in Australia.

Subjects

Within the population available to the Mt Druitt Longitudinal Study of which the reseach reported here formed part, children were spread across five schools within the Mt Druitt district and three schools located elsewhere within the Sydney greater metropolitan area. All Mt Druitt schools had been identified by the Australian Schools Commission for special additional funding as a "disadvantaged" school. The poor average performance of the children upon tests of educational achievement and the presence of Aboriginal children and single parent family children as a greater proportion of the Mt Druitt school's population than normally found in Australian schools were partly responsible for the identification of the schools as "disadvantaged". None of the three additional schools had ever been identified as disadvantaged in a similar way.

The male parent or guardian of Mt. Druitt children occupied positions significantly different from those of non-Mt. Druitt parents. Mt. Druitt male parents were found far more frequently in "blue-collar" work as tradesmen, labourers or assistants than were the male parents from the contrasting schools, over 50 per cent of whom were employed in sub-managerial, managerial or professional postions. There were 18.2 per cent of single parent families in Mt. Druitt compared to 10.8 per cent elsewhere and male unemployment registered at 9.6 per cent of Mt. Druitt male parents (in 1981) compared to 0.5 per cent for contrasting school male parents. The mean achievements of children in two of the contrasting schools were significantly greater than Mt. Druitt children for mathematics, vocabulary development and reading comprehension. The children of the third contrasting school were significantly better than some, but not all, Mt. Druitt schools' children.

In 1981, as an extensive systematic observation study was to be conducted it was not possible to include all classes in the observed sample. A selection of 17 classes was made from the 34 available in order to include at least two classrooms at each of the eight schools; an additional class was chosen from amongst those at the largest Mt. Druitt school. An attempt was made in 1981 to include all "A" stream classes, an equal number of male and female teachers and a representation of all age ranges of teachers in the total sample.

In 1982 as extensive ethnographic, rather than systematic, observation was to be conducted all but four of the 32 available classrooms were observed for disruption. Four teachers who had been observed in 1981 were avoided in 1982. There was a slightly greater representation of older (over 31 years) teachers in the contrasting schools in that year, although as age of teacher does not appear to be related to rate of disruption in classrooms this does not present a major threat to the survey design.

The Observation Instruments

The review of the research literature dealing with classroom disruption did not identify a pre-existing instrument which would enable systematic observation of all variables of interest in the consideration of disruption in the Mt Druitt and Contrast Schools'classrooms. Concerns with instructional context, the pupil initiator/s of the disruptive incident, the nature of the pupil disruption, the nature of the teacher desist and the immediate effect of the desist, the events (or facets) of interest in the present study, were not reflected in pre-existing instruments; at least, not in total. It was clear that an original instrument would need to be developed for the Mt Druitt Longitudinal Study.

Observation in the classroom, discussions with teachers, and the review of the relevant literature led to the development of check lists of possible pupil and teacher behaviour during disruptive incidents. Further observation in a variety of classrooms led to elimination from the lists of rare behaviours, on the basis that establishment of reliable observation would prove most elusive for such categories, and to extension and refinement of the definitions and illustrations of each remaining pupil disruption and teacher desist category. During the training period, with the benefit of additional insights from the three experienced observers undergoing training, some further sharpening of definitional boundaries occurred.

As observation of disruptive incidents was to occur in the context of systematic observation with a broader focus executed through the adoption of a version of the Personal Record of School Experience (PROSE) instrument (Medley, 1969) categories assigned to instructional contexts in PROSE had previously been learnt by the observers. Both for simplicity in observation and as a check on differential rates of disruption in different instructional contexts, through a comparison with PROSE records obtained in the same classroom, the same PROSE categories were adopted within the disruption monitoring instrument.

As a check on immediate effectiveness of teacher desisting a simple three-fold classification (cessation or lessening of pupil disruptive behaviour, no change discernible in pupil disruptive behaviour, an increase or strengthening of pupil disruptive behaviour) was adopted. Through classroom trialling during preliminary observation this approach was found to be acceptable, problems arising only when the observer could not make a decision from observation, as to which category applied. In such cases the most conservative decision was adopted, the category of no discernible change being assigned and the system was found, in these circumstances, to be reliable. The instrument was named DESIST, after the Kounin usage of the term.

The Mt Druitt Longitudinal Study adaptation of Medley's (1969) PROSE instrument was particularly used. As a further data source, the instructional context facet categories and the pupil misbehaviour facet categories were placed together to form an instrument, called here the Off-Task Scan. This instrument was employed so as to produce a 'snapshot' of the class activities, giving a detailed count of all pupil off-task behaviour category by category at a single point of observation (say, within one minute). The Instructional Context in which the pupil behaviour was occurring was recorded. Off-Task Scan gave a record of potential disruptive incidents at one point; it provided a record of all pupil initiated transgression of rules for classroom behaviour.

Three experienced observers were trained, over a period of fifteen days, until such time as satisfactory inter-observer reliability had been established for both the PROSE and the two disruption instruments. Initially, training time was spent in discussion and memorisation of all categories. This was followed by a short period of three days observing videotaped excerpts of actual classroom interaction, chosen from a set of available tapes, specifically because the majority of categories were illustrated on the tapes. Time was then spent observing, singly, in pairs, or as a group of four, live classroom interaction. Inter-observer reliability was accepted as reaching a satisfactory level when 80% agreement or better between each of the six possible pairs of observers was reached on at least three consecutive periods of observation. Reliability was re-established, at least at the same level, prior to commencement of observation in the second year of the Study.

The Observation System

Given the DESIST, PROSE and Off-Task Scan instruments and four trained observers, a schedule of observation for 1981 was developed. Observation of disruption would be carried out by at least two observers on at least two days (i.e. at least one day each) in each of the observed classrooms, for a minimum period of at least four observation occasions per day. DESIST was designed to produce a reliable time sample of actual disruptive incidents, i.e. as disruptive incidents occurred, they were noted by the assignment of one category for each of the six facets of disruption covered by the instrument. A five minute time period was adopted as the basic unit of observation; any disruptive incident which was observed during this period was recorded, the number of incidents being limited, hypothetically, only by the teacher's ability to deal continuously with disruption for the five minute period and the pupils' role transgressions.

The five minute observation periods were dispersed throughout the morning observation following each fifteen minute period of PROSE observation so that, generally,at least two DESIST periods occurred prior to morning recess and at least two in the following period prior to lunch. PROSE observation of each target child took place for an elapsed period of five minutes with three target children being observed in a succession of five minute periods in one observation period. PROSE viewing produced at least one hour of data each day with the instructional context noted once every twenty-five seconds during observation. The Off-Task Scan observation occurred prior to the PROSE recording. Each complete observation period comprised:

one period of approximately one minute of Off-Task Scan observation;
three by five minute periods of PROSE observation;
and, finally, a five minute DESIST observation.

In 1982 an ethnographic study of selected classrooms was made although DESIST observation was also conducted in all but four of the 32 classrooms. This systematic observation was carried out by two observers who visited each classroom for a morning; thus, at least eight DESIST observations were completed (four by each observer), in a period of two separate mornings of observation.

Results

Statistical computation was carried out through the programs available within the SSPS computer package (Nie, Hall, Hull, Steinbrenner and Bout, 1975). Having regard to the nature of the samples within the study, with some tests of significance being carried out with groups of ten classes or less, it is best to regard any findings as tentative and suggestive of later hypotheses. Nevertheless, a significance level of .05 was accepted as indicative of a reasonable probability that samples were drawn from different populations so as to maximise identification of useful hypotheses for later investigation.

a) Disruptive Incidents, Rates of Occurrence

The review of studies reporting data from which a rate of occurrence of disruption statistics could be identified had not led to a decision with regard to a most common rate. It may be remembered that in those studies a range of disruption per 30 minutes from 1.95 to 50.4 had been noted, with a mean of 15.67 disruptions per 30 minutes and a standard deviation of 14.8. The rates of occurrence of disruption observed in 1981 and 1982 are reported in the Table overleaf.

As the Table indicates, the range of rates of occurrence of disruption in 1981 ran from a lowest rate of 6.0 disruptions/30 minutes to a greatest rate of 25.99 disruptions/30 minutes, while in 1982, a lower limit, 1 disruption/30 minutes, and a higher limit, 37 disruptions/30 minutes, were registered. Compared to disruption rates recorded in primary classes in the U.S.A., these New South Wales classrooms displayed both an absolutely lower limit, 1.0 disruption/30 minutes, to the occurrence range, and, in both years, a lower mean occurrence of disruption rate. In several of the U.S.A. studies, teachers had been nominated by their School Principals for inclusion in the study because the Principal believed the teacher would benefit, ie, several studies may have included teachers believed to be poor managers. None of the teachers included in the observation reported here were identified spontaneously by their Principals as being poor managers - although casual observation by the study research staff, prior to undertaking systematic observation, had indicated that a range of managerial skills was likely to be represented in the behaviour of teachers observed. Principals were not asked to comment on the managerial skills of any of their teachers in this study. There is no reason to expect that, as a group, teachers were any less, or any more skilful as classroom managers than would be the case for New South Wales Primary School teachers generally and the probability is that a representative range of disruptive incidents and teacher ability to handle disruption were captured in this study. There is, however, no way of being certain that this was so.

Table 1
Rates of Disruption/30 Minutes: All Classes Observed
1981 and 1982

1981 Class	1*	2	5	8	9	10	12	13	16	20	22	25	26	29	30	31	33			X̄
1981 D/30	11.25	22.5	15.69	7.99	14.25	9.6	23.25	25.98	7.5	12.66	12.00	6.00	15.00	12.00	9.33	12.00	19.09			14.715
1982 D/30	** 6.00			24.00	22.00	7.00	24.00					12.00	12.00					6.0	18.0	
1982 Class	4			8	9	11	12					25	26					1	2	

1981 Class																				
1981 D/30																				
1982 D/30	12.0	19.0	37.0	34.0	12.0	23.0	12.0	14.0	12.0	12.0	24.0	10.8	6.0	12.0	8.0	12.0	1.0	6.0	29.0	15.24
1982 Class	3	5	6	7	10	13	15	16	18	19	20	24	27	28	29	30	31	32	34	

(* Class ID's are for Longitudinal Study purposes only.

** Disruption/30 minute Rates are aligned for classes comprised of 85% same pupils.)

The first set of comparisons displayed in Table 2 below, are the calculations from the data of the rate of occurrence statistic, the disruption/30 minutes measure, for 1981 and 1982. The concern here is with the expectation of differential rates of disruptive incidents in classrooms at different grade levels, with higher grades expected to display less frequent disruptive incidents. As far as could be ascertained from the literature review results tabulated below are the first derived from a longitudinal study of disruption, all others being findings in cross-sectional research.

Two comparisons are reported: the first includes all schools while the second draws data from Mt Druitt schools only.

Table 2
Comparison of Disruption/30 Minute Rates for 1981 and 1982

Year	Schools	N	$\overline{X}$	Variance	SD	t	df*	Siglev
1981	All	17	14.715	37.858	6.153	-.23	42.18	0.817
1982	All	28	15.239	79.503	8.916			
1981	Mt Druitt	11	16.27	29.964	5.474	-.52	26.99	0.609
1982	Mt Druitt	18	17.66	80.623	8.979			

(* separate variances assumed)

As the Table indicates for both comparisons the greater rate of disruption occurs in the second year of observation although in neither case is there a significant difference between occurrence of disruptive incidents in 1981 compared to 1982. The results here do not support the expectation that disruptive incidents become rarer with the increasing grade levels of the pupils.

b) Teacher Responsibility for Classroom Disruption

There was much evidence available in the research literature to show that manipulation of teacher managing behaviour was associated with changes in pupil behaviour. Such findings suggest that it may well be possible to observe that the same class group of children, given changes in teachers, may display different rates of disruption; i.e. it may not only be pupil transgression of rules which create disruptive incidents but also teachers' varying ability to ignore or manage such transgressions. In Table 3, below, the disruption/30 minute rates for seven classes observed in 1981 and 1982 are listed. Attention here has been directed to disruption/30 minute rate for classes comprised of at least 85% of pupils in common over the two years although they had different teachers in each year.

Table 3
Disruption/30 Minute Rates: Classes Comprised of 85% Common Pupils, 1981, 1982

1981 Class Id	1	8	9	10	12	25	26
1981 D/30	11.25	7.99	14.25	9.6	23.25	6.00	15.00
1982 D/30	6.00	24.00	22.00	7.0	24.00	12.00	12.00
1982 Class ID	4	8	9	11	12	25	26

Computation of a coefficient of correlation (Pearson Product Moment) for the disruption/30 minute rates for the classes across years produced a non-significant coefficient of 0.3417. The implication of the finding is that the relationship between the disruption/30 minute rates across the two years was a chance occurrence, even given the similarity of pupils. Now, the pupils may have been: as disruptive but the teachers in either year were more or less tolerant of disruption; more or less disruptive but reacting to changes in the teacher's management skills and techniques and/or teacher's tolerance level of rule transgression; or, more or less disruptive because of differential levels of pupil initiation of disruption but such behaviour being accompanied by the same intensity of teacher response in both years. Although reliable changes in pupil initiation of disruption across the year cannot be ruled out as an explanation neither can reliable changes in the teacher's ability or unwillingness to manage disruption with one teacher being more or less able or willing than the other. Teacher responsibility for the level of disruption, at least in the sense that they do not employ strategies which would control disruption, cannot be eliminated on this evidence.

c) The Relationship of Disruption and Disadvantage

The second set of comparisons calculated from the observation data was concerned with the relationship between disadvantage and disruption and the question of differential rates of occurrence of disruptive incidents in the disadvantaged, Mt Druitt classrooms compared to those non-disadvantaged classrooms located elsewhere. A test of difference between rates, with the class as the unit of analysis, was performed via the S.P.S.S. program (Nie *et al*, 1975). Results are tabulated below.

Table 4
Comparison of Disruption/30 Minute Rates for Mt Druitt and Other Classes: 1981 and 1982

Year	Classes	N	$\overline{X}$	SD	t	df*	Siglev
1981	Mt Druitt	11	14.79	6.39	1.09	15	.3
	Contrast	6	11.24	6.43			
1982	Mt Druitt	15	17.1933	9.468	1.78	23	.08
	Contrast	10	10.88	7.306			

(* separate variances assumed)

In neither year is the comparison found to be statistically significant (at the $p < .05$ level or better) although the result for 1982 approaches significance.

The expectation that children from a lower socio-economic status background would exhibit higher rates of disruption is not supported. This, of course, immediately brings into question claims of a causal nature; the claim that higher levels of psychological disturbance suffered by lower socio-economic status pupils cause higher rates of classroom disruption, for example, must be viewed with suspicion until grounded in evidence.

It may also be hypothesised that children in the lower socio-economic background classrooms may have been more disruptive than their non-disadvantaged peers although the Mt. Druitt teachers may have chosen, deliberately or otherwise, to ignore some off-task behaviour. This interpretation of the finding is not supported by the levels of off-task behaviour recorded via

PROSE or Off-Task Scan. For the data derived from both instruments there was no statistically significant differences for the amount of off-task behaviour observed (PROSE) nor for the number of children observed off-task at any one time (Off-Task Scan). It seems that variation in teacher ability or willingness to desist remains a more likely explanation of the finding.

d) The Relationship Between Prior Academic Achievement and Disruption

The next set of contrasts is concerned with the relationship between academic achievement and differential rates of classroom disruptive incidents; the expectation derived from the literature was that lower achieving children would display greater levels of disruption. For this contrast classes were divided into two groups across schools. "A" stream classes, identified within schools by the higher levels of academic achievement of the pupils grouped into them, were contrasted with the 'B' stream and other class groups for the rates of disruption/30 minutes. All classes observed at Contrast School 1 were, what is known as, parallell, i.e. streaming was not practised as a method of grouping within Grades at this School. Contrast School 1 pupils' performance in language and mathematics achievement tests were amongst the highest observed; their standardised test performance placed more than three quarters of them in the ninth (highest possible) stanine. All but a few pupils from Contrast School 1 would be placed in an 'A' stream class if they were to live in Mt Druitt and attend school there. In the calculations which follow all Contrast School 1 classes have been treated as if 'A' stream.

From these calculations, displayed in Table 5 overleaf, the achievement level of pupils on entry does appear to be related differentially to the level of disruption present in the classroom.

An additional way of viewing disruption is to consider the frequency of periods of instruction free of interruption; it may be the case, for example, that patterns of occurrence of disruption may differ across classes, with classes with the same disruption/30 minute rate having different patterns of disruption. More-or-less concentration of disruption in instruction time with different patterns of crowding or dispersal of disruption may occur. When 'A' stream classes are compared with 'B' stream or other classes for periods of observation (five minute samples) free of disruption no significant difference is found between them (for the 1982 data, t = 176, df = 1152, p<.104). The observation of disruptive incidents in both 'A' stream and other classes indicates that, while significantly greater disruption incidents occur in non 'A' stream classes, with lower ability pupils, the spread of the disruption observed in classrooms of each type over the observation periods was similar. To restate the finding, in any five minute period, the observer was as likely to view a disruptive incident in an 'A' stream class as in any other class, although significantly more frequent disruption would be observed in the non 'A' stream classes in each period of observation.

Table 5

Comparison of Disruption Rates for 'A' Stream and Other Classes, 1981 and 1982

Year	Classes	N	$\overline{X}$	Variance	SD	t	df*	Siglev
1981	'A'	8	10.41	25.478	3. 3	2.61	15	.02
	Other	9	18.44	30.928	6.15			
1982	'A'	10	9.81	35.524	4.795	2.45	21	.02
	Other	13	17.969	87.925	9.614			

(* separate variances assumed)

e) Mild or Serious Misbehaviour

As it had been suggested, both by Mt Druitt teachers and within the literature, that low-income children present greater difficulties in the classroom a comparison of the seriousness of the misbehaviour noted in Mt Druitt classrooms and that noted elsewhere was carried out by computation of a one-way chi-square statistic. Talk off-task, listening or watching off-task, playing, sulking, crying, alternative task involvement, tardiness or passive behaviour have been considered mildy deviant, in that they affect few pupils other than the pupil initiator. (This is not to deny that pupil sulking and crying in primary grades may be symptoms of worrying underlying personality problems.) On the other hand pupil call-outs, verbal and physical aggression, arguing with the teacher, tantrums and out-of-seat behaviour have been considered as more seriously deviant for they interfere with on-task engagement of many or all other pupils in addition to the pupil initiating the behaviour. Classes were divided into three groups according to their position in the lowest, greatest or middle third of the total sample stratified by mean occurrence of mild or seriously deviant behaviour per Off-Task Scan. Two comparisons, one for mild, and one for serious deviance, were computed (with the Yates Correction for small n's being applied).

Table 6

Mildly Deviant Misbehaviour: Average Number of Pupils Observed per Off Task Scan by Class: Third Grade, 1981

Average Number Observed	Mt Druitt Classes	Contrast Classes	Group	χ^2	p
Less than 3.6	3	3	Lowest Third		
3.6 - 4.0	5	1	Middle Third	1.5	.47
4.1 - 5.5	3	2	Highest Third		

While no significant difference was found for mild misbehaviour when Mt Druitt pupils were compared to the Contrast School pupils, it could remain that differences would be found for more serious misbehaviour. The results of the comparison for serious deviances were reported in the next Table.

Table 7

Seriously Deviant Misbehaviour Average Number of Pupils Observed per Off-Task Scan by Class Third Grade, 1981

Average Number Observed	Mt Druitt Classes	Contrast Classes	Group	χ^2	p
Less than .26	3	3	Lowest Third	3.86	.15
.27 - .43	3	3	Middle Third		
.44 - 1.48	5	0	Highest Third		

Again, there was no significant difference in the initiation of serious misbehaviour by Mt Druitt, disadvantaged pupils compared to their Third Grade peers in Contrasting Schools. The Mt Druitt pupils were as likely as Contrast pupils to be found in classrooms in which relatively little, serious misbehaviour was observed.

It might well be noted, at this stage, that serious deviancy was observed in all classrooms at lower limits of initiation than was true for mildly deviant behaviour. Indeed, some categories of serious misbehaviour almost never did occur. A child displaying a temper tantrum was observed on only one occasion, there was very little verbal aggression and only slightly more physical aggression noted. Sulking and crying behaviours were noted from only six children. When it is considered that observers were present in the Third Grade classrooms on thirty four days then serious deviancy, apart from 'call-outs' and 'out-of-seat' could be considered a rarity. The predominance of those two categories amongst the serious deviancy behaviours observed may, if reflected in classrooms elsewhere, account for the attention they have received in the intervention literature.

f) Teacher Desisting Effect

For all observed classes the majority of the teacher desists of pupil disruption was followed by a decrease in the student misbehaviour. In 1981 no teacher desist was followed by an increase in misbehaviour although in 1982 increases were noted in three classrooms. In 1981 almost 92 per cent of teacher desists were followed by decreases in misbehaviour whilst in 1982 almost 85 per cent of desists were so followed. Overall, then, teacher desists did appear to be immediately effective. White (1975:371) had suggested, however, that desists are reinforcing to teachers because they were immediately effective in terminating or lessening misbehaviour although their disapprovals are "not likely to decrease behaviour in the long run".

In Tables 8 and 9 are listed (Pearson product moment) correlation coefficients for the relationships existing between the 'disruption/30 minute' rate and the three levels of observed effectiveness (cessation or decrease, no change, increase) for both 1982 and 1981 data.

Table 8
Correlation Between Disruption Rate and Desist Effectiveness: 1982

1982	Rate	Decrease	No Change
Decrease	- .4904**		
No Change	.0493	- .025	
Increase	.4775**	- .9875**	- .1308

(** $p < .005$)

Table 9

Correlation Between Disruption Rate and Desist Effectiveness: 1981

1981	Rate	Decrease	No Change
Decrease	- .6082**		
No Change	.2249	.0085	
Increase	*		

(* No disruptive behaviour was observed to increase following a desist).

The Tables clearly show that a significant relationship existed in the observation data for both years between the rate of desisting and effectiveness; teachers who desisted more frequently appeared to be less effective in that pupil misbehaviour in their classes was both less likely to decrease following their desist and in 1982, at least, more likely to increase following their desist. Analysis of the data does not provide immediate insights into underlying linkages in these relationships: teachers whose desisting was followed by increases in pupil misbehaviour had both low rates (12 disruptions/30 minutes) and high rates (23 and 29 disruptions/30 minutes); teachers with high rates of the no change category (say, greater than 25%) had both low rates of desisting (7 or 13 disruptions/30 minutes) and high rates (34 and 37 disruptions/30 minutes). What is identified by this finding is the possible existence of a 'management' trap as it seems, for some teachers in the sample, the more they managed the more there was to manage.

Observation data gathered in both years, while the children were in Grade 3 and Grade 4, supports White's hypotheses, in that it appeared that teacher desists were, on the whole, immediately effective, but that in some classes higher rates of desisting were associated with increases in pupil misbehaviour (1982) or with lower levels of observed lessening or cessation of the pupil transgression (1981 and 1982).

Discussion

The failure of the observation reported here to substantiate the expectations which the literature had built up with regard to classroom misbehaviour of disadvantaged pupils came as something of a surprise, although the few researchers who have systematically studied pupil classroom behaviour have not reported higher levels of disruption in low-income classrooms (e.g. Harvey 1980). The failure to substantiate Mt Druitt teachers' perceptions of their pupils is even more intriguing and while it is fashionable in some quarters to discount teacher perceptions and explanations of their own classroom behaviour, it would be unwise to dismiss summarily these teachers' claims without investigation. How could the teachers hold opinions which did not match observed reality? Several suggestions arise in the research literature dealing with classroom disruption which would help to explain the apparent paradox, and observation derived from experience with the Mt Druitt schools can also be canvassed.

Harvey's (1980) study of Second Grade low-income classrooms in eight schools situated in a north-western population centre in the U.S. appears a particularly thorough investigation, with twenty days observation in each class. Harvey (1980:311) reported "measures of noisiness, destructiveness, noncompliance, negative physical behaviour, and negative student-peer interaction did not distinguish between low and high income classrooms". A measure of behaviours Harvey called "secondary self-stimulation" did, however, distinguish between the classrooms. These behaviours accompanied other activities Harvey termed "primary behaviours" and were seen by teachers (p.312) "as indicative of anxiety, embarrassment, frustration, boredom, hostility, and even heavy concentration". In the ethnographic observation of classrooms in the Mt Druitt Longitudinal Study during 1982 comment was made by observers that secondary self-stimulation was more readily apparent in Mt Druitt classrooms than in Contrast School rooms although no systematic measure of it was taken. Children were noted who ceaselessly rocked the chair, or who drummed pens or pencils on the desk, or who twiddled with their hair as they read or worked, amongst a great many other activities of the same type. Mostly those secondary behaviours did not appear to interfere with the completion of, or attention given to, the children's primary task. It may be that Mt Druitt teachers share the interpretation of secondary self-stimulation apparently held by the teachers in Harvey's study, viewing even attentive children as, somehow, off-task.

Of course, it was not only teachers who perceived higher levels of disruption in Mt Druitt classrooms. Early in 1981 casual observation by the Mt Druitt Longitudinal Study research team had alerted them to the possibility of frequent classroom disruption; the researchers shared the teachers' perceptions of the behaviour of the Mt Druitt children. It might be the case that the early observation, although casual, and the teachers' expressions of belief of greater classroom disruption gathered early in 1981 were both right at that time.

Mt Druitt children may have been more disruptive early in their Third Grade year. N.S.W. schools have been structured in the past so that a managerial and physical gap existed between the first three Grades (K-1-2), known as Infants, and the later four (3-4-5-6), known as Primary. This arrangement applied in all the schools in the Longitudinal Study. There is a somewhat shared opinion that the Primary School in N.S.W. is a more formal educational setting than the Infants' School. Mt Druitt children expressed such an opinion when they were interviewed early in 1981, reporting a belief that different behaviour would be required of them following their graduation from the Infants to the "big" school. It may be that the Primary teachers found the behaviour of the Third Grade children unacceptable early in the year and worked systematically and successfully to change the pupils' inappropriate behaviours. This could explain the findings of no difference in the observed behaviour of disadvantaged children when compared to non-disadvantaged pupils at the end of the second term and the beginning of the third term (of a three term year) in 1981 and 1982.

Schools had been seen to take deliberate steps later in 1981 and 1982 to increase academic engagement and decrease rule transgression by their pupils. For Mt Druitt a "bandwaggon" effect for an "educational" innovation imported from the South Australian Department of Education had been noted. Each morning the school day began, in three of the five Mt Druitt Schools, with a 15-20 minute period of physical activity. Teachers reported the adaption of this strategy as a means of "decreasing pupil aggression", or "helping the children's concentration", or "tiring them out a little so they don't jump around as much in class" (private conversations with teachers) and all teachers questioned seemed convinced that the physical activity was "helping the children's school work".

A concerted effort had also been made by Primary Schools in Mt Druitt to decrease rule transgressions by shedding the most noteworthy of their misbehaving children; two special "acting-out" classes had been organised in centrally located schools and pupils from surrounding schools were sent to them on the recommendation of the School Counsellor and the School Principal. While no children from the Mt Druitt Longitudinal Study had been sent to such a class, their existence indicated something of the official view of misbehaviour held in the Mt Druitt area. None of the non Mt Druitt schools had access to special "acting-out" withdrawal classes.

Perhaps the non existence of these special classes ensured that several particularly "naughty" children located in non Mt Druitt schools were retained within their local School and attended to by the normal teaching staff. The behaviour of a particular child enrolled at the higher socio-economic status near-city suburban school comes particularly to mind in this context. This boy seemed at times typical of the child with personality deficits pictured by those holding a 'clinical view', being quite out-of-control of the teacher, and lacking self control. While required work was often completed a constant and loud stream of commentary and jingles accompanied it, out-of-seat behaviour was frequent, running and jumping about often seen and verbal aggression towards other pupils noted. At Mt Druitt this boy may well have been a candidate for removal to the withdrawal class. At his present school, the teacher accepted his behaviour with a benign complacency, explaining to an observer that she had a special warmth of feeling for the child because she admired the well developed sense of humour he possessed. His peers appeared to accept, and readily excuse, his behaviour; it did not noticeably distract them from their work.

This ability of the majority of children to continue to attend to learning tasks despite class disruption was observed in all classrooms. While no systematic record of the individual pupil's rate of initiation of disruption or off-task behaviour was maintained in either year, all observers reported a strong impression that disruptive behaviour which led to disruptive incidents was initiated by relatively few, five or six only, of the pupils in any class. Most children persisted with learning tasks with occasional short term non-serious off-task behaviour, such as observation of other pupils or quiet chatting with a nearby classmate, noted. If this belief was substantially accurate as a picture of pupil behaviour, it implies that teacher action to establish greater control of all pupils, or to further promote the already existing high levels of pupil self control, would not be overly difficult or too distractive of teacher attention to other of the variety of compelling teacher tasks. Our Special Education colleagues, who have demonstrated an admirable ability to teach pupils with no past record of attending behaviour to pay attention to learning tasks within a remarkably short period, come to mind in this regard.

Perhaps it is the case that those teachers who are notable in the sample observed for the relative low rates of occurrence of disruptive incidents and/or the low rates of observed pupil off-task behaviour have identified the small number of most likely disruption initiators and pay special, if subtle, attention to them. Such teachers, whom Kounin (1970) recognises elsewhere as "with-it", appeared to exert little effort in maintaining a sense of peace, order and purpose in their classrooms.

The data derived via observation employing the DESIST instrument revealed a pattern of classroom disruption for each of the instructional contexts coded for each teacher. This information was extended by the complementary data derived from PROSE observation and, thus, enabled an identification to be made of those classes/teachers who diverged from the general pattern in the sample observed. *Overall, the greatest mean level (88.9%) of on-task pupil activity was achieved in* the whole class setting, as Rosenshine and Berliner (1978) had predicted. The mean on-task pupil activity achieved in the no pupil/teacher interaction context was next highest, at 84%, which the lowest level was recorded in the individual pupil/teacher interaction setting, at 80.3%.

1981 Classes identified earlier as 1 and 16 achieved higher rates of on-task engagement than the mean level in all three settings. In class 1 the teacher shared jokes and songs with the pupils. The other class (16) was also a Mt Druitt group with a younger, female teacher notable both for a high level of commitment to the children of Mt Druitt, and to the cognitive development and extension of her class. On first viewing this teacher's style had appeared teacher-centred, formal, cold and demanding. Later in the year, when the systematic observation was taking place, it was noted that a great deal of subtle teacher support and interest was being conveyed to the children, they were responding with enthusiasm and creativity to the intellectual demands being placed upon them, and they were responding in a formal, "well mannered" way to the behavioural expectations conveyed to them by a young teacher who had obviously captured the children's enthusiasm and regard. There was little about their class which matched the picture of disadvantaged children as painted in the literature.

In the same Mt Druitt School Class 20 was located. There all three pupil on-task activity levels were lower than the mean level reported for the sample; class 20 being the single class with lower levels in all three settings. Other classes had lower levels in one or two but not three groups. Class 33, a Contrast School group, had a significantly lower level of on-task activity in the individual pupil/teacher interaction setting, while Class 10, a Mt Druitt group, had a significantly lower level compared to the mean for the sample and to the respectably high levels in other settings in the same class, for the individual pupil/teacher interaction setting.

Speculation that in-service strategies to assist teachers raise the level of on-task activity amongst their pupils may need to be somewhat tailored to the individual teacher's pattern of strengths and weaknesses seems justified by results such as those. At a time when in-service teacher education activities are being curtailed in N.S.W. schools for financial reasons, and when teacher apathy with regard to in-service activity appears to be growing, the production of an in-service classroom management skills package which could be employed in a flexible and responsive fashion is called for. Alongside such planned experiences it might well be useful also to organise a program of informal visits and discussions between teachers on the same grade in the same schools.

In quite recent months in N.S.W., all Government schools have been required by their Director General of Education to "formulate a discipline policy". The printed information circulated amongst schools at the time of this directive advised that, as parents and teachers share responsibility for the development and education of children, parents should be involved, alongside teachers, in the development of the policy. Schools in the Mt Druitt Longitudinal Study appeared to take this request seriously and a series of meetings, surveys, seminars and discussions took place between teachers and parents in all eight schools. As far as the Longitudinal Study research team is aware, none of the policy statements developed as a consequence of these exercises alluded to the necessity for systematic development of the teachers' managerial skills as an integral part of a school's discipline policy.

As the data and the findings reported earlier clearly indicate teachers' skills in managing generally, and particularly in constructing classroom environments in which pupil on-task activity is maximised and pupil initiated disruption minimised, varied greatly between teachers. Such variation can be accounted for to some extent by characteristics of the pupils, such as their level of achievement prior to instruction, although this does not provide a full explanation. Additional variables must impinge upon the instructional setting to produce the observed variation reported here; teacher's skills and techniques, or their lack of them, must be taken into account as well as teacher characteristics, such as their "with-it"-ness. Teachers must be aided to: first, identify their managerial strengths and weaknesses; and, second, to accept responsibility for their personal, professional development; and, third, to undertake steps necessary to improve their skills. If a systematic process such as that is not done, it remains too easy to evade accountability by the ruse of asking "what can you do with children like that, from families like those?"

Almost every time the Longitudinal Study team sets out to substantiate a hypothetical characteristic of the life, experiences, accomplishments, or background of the disadvantaged child, a myth is destroyed. There is, for example, no cumulative achievement gap in the tested outcomes of Mt Druitt disadvantaged children; their parents are strongly supportive of the schools and have high expectations of the outcomes of their child's schooling experience.

Disadvantaged children were not found, in the systematic observation reported here, to be any more, or any less disruptive in school than were the non-disadvantaged youngsters with whom they were compared.

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PUPILS' AND TEACHERS' EXPECTATIONS FOR THE ACHIEVEMENT OF YEAR 4 CHILDREN

At present the performance of children at school is being closely examined by the public. It is therefore an appropriate time to investigate underlying processes which help to determine the level of pupils' achievement. It is widely accepted that the expectations of teachers and parents for children's school performance influence their attitudes to school and motivation to perform well. This paper examines both children's and teachers' expectations for performance on assessment tasks held at the end of the school year. All of these tasks were carried out as part of the Mt Druitt Longitudinal Study, which has as its major concern the evaluation of the academic achievement of children in the primary school.

Previous results show that very young children (Kindergarten-Year 2) have uniformly high expectations for success at school (Entwisle and Hayduk, 1978), and that some junior high school pupils, particularly low achievers, have low expectation for success at school (Brookover, Erickson and Joiner, 1967). At some point experience of the education process forces children to have a more realistic appraisal of their chances for success at school. The data in the present study were collected from children in Year 4 in primary school, an intermediate point between reports in the literature of high expectation and low expectation for children. Identifying the point at which children's high expectation begins to change to low expectation and describing the attendant conditions would be an important contribution to educational research.

This study is primarily interested in the expectations of children. The major questions asked about children's expectations are:

a) are there any differences between the expectation levels of high and low achievers and,

b) between boys and girls?

c) how closely do the expectations of these groups of children match with their obtained scores?

d) how closely do the children's expectation match with the teacher's expectation?

The major questions asked about teachers' expectations are:

i) do teachers have different expectations for high and low achievers, boys and girls?

ii) how closely are the expectations of teachers matched with the children's actual scores, and the children's expectations?

REVIEW OF EXPECTATION STUDIES

Teacher Expectations

Since Rosenthal and Jacobsen, (1966) enunciated the 'self fulfilling prophecy' in relation to teacher expectations, many studies have attempted to document the existence of teacher expectation, i.e. a set of opinions held or inferences made by teachers about the present and future academic achievement of their pupils. Expectations concerning the classroom behaviour of pupils are also held by teachers (Brophy and Good, 1974). The unpalatable aspect of the self fulfilling prophecy as reported by Rosenthal and Jacobsen, was that a failure expectation, held by a teacher for certain pupils, could set up a complex chain of expectations and events, resulting in lowered performance levels for those pupils.

Alhough the original study was widely criticised and 'self fulfilling prophecies' have been difficult to replicate experimentally, an overall assessment of 300 expectations studies carried out both in classrooms and laboratory situations have confirmed an expectancy influence on subject behaviour (Cooper, 1979). Where studies reported expectation data of individual teachers, 70 per cent showed means in a direction confirming expectation influence (Cooper 1979). However, the evidence has been inconclusive enough to lead reviewers to admit that expectation effects do not always occur and that they seem to be dependent on the teaching philosophy and teaching style of the teacher (Brophy and Good, 1974).

The nature and direction of the relationships of teacher expectation and pupil achievement has not been resolved. Thus, it is now doubted that inaccurate teacher expectancy can substantially alter student performance as implied by the "self fulfilling prophecy" doctrine (Cooper 1979).

School practices can affect teachers' expectations, with streaming tending to lower teacher expectation and retarding the academic achievement of low socio-economic status and/or low achieving pupils, (Barker Lunn, 1970). This effect was noted not only for individual pupils but for whole classes of pupils (Barker Lunn, 1970). Moreover, school events early in the child's school life can promote the development of patterns of teacher and child expectations that are potentially debilitating for low achievers (Rist, 1970; Entwisle and Hayduk, 1978). Recent reseach opinion is that it is probably impossible to raise or lower teacher expectation artificially and to have these effects carried through into pupil performance (Cooper, 1979). However, naturally formed teacher expectations can serve at least to maintain pre-existing achievement levels among pupils (Dusek and O'Connell, 1973, Rist, 1970), or to alter the performance of pupils who base their own expectations on perceived teacher expectations (Brattesani, et al, 1981).

The central problem in determing the impact of teachers' expectations on pupil achievement is the inability to show causal direction in teacher expectation effect, i.e. teachers' expectations may be influenced to some extent by previous performance by the child. It has been argued that evidence was evenly balanced as to whether student achievement causes expectation, or whether the expectation causes achievement (West and Anderson, 1976). More recent research, however, has shown that teacher expectation and behaviour account for variance in academic attainment over and above that explained by previous achievement (Brattesani, et al, 1981).

Children's Expectations

In the area of children expectations of success, it has been hypothesised that repeated failure is evaluated by the child and results in decreased expectancy, while repeated succcess leads to raised expectation. For very young children in Kindergarten, this does not oppear to be the case for despite repeated failure, some low achieving children have maintained very high expectations until the end of Year 2 (Entwisle & Hayduk, 1978). High achieving children, on the other hand, modified their expectations over time, until at the end of year their expectations were much more in line with their actual performance.

Sex differences in Expectations

Numerous studies have examined sex differences in children's expectations with the hope of explaining different achievement patterns shown by girls and boys. There is accumulating evidence that girls have lower expectancy of success than boys (Parsons, et.al, 1976; Maccoby and Jacklin, 1974; Dweck and Guillard, 1975). Present research has suggested that the expectancy patterns of girls were more unpredictable (Parsons, Kaczala & Meeces, 1982) and that statements of low expectancy in boys were followed by increased persistence, whereas girls showed decreased persistence following low expectancy statements (Dweck and Guillard, 1975).

METHOD

The subjects in the study were 60 year 4 pupils enrolled at Sydney schools, 30 of the children were labelled as 'high achievers' and 30 children were 'low achievers'. The 30 high achieving children were randomly selected from pupils who scored within the top 25 per cent of the Mt Druitt Longitudinal Study sample, who completed the ACER Primary Survey Reading Test, Comprehension Level A Form R. This test was administered in November 1981, when the children were in Year 3 of primary schooling. The 30 low achieving children were randomly selected from pupils who scored within the bottom 25 per cent on the above test. Boys and girls were equally represented in both achievement groups.

The study of teachers and pupils expectancies was part of a larger study which also examined children's attributions for success and failure in academic situations at school. Only data directly relating to expectations is reported here. Children were interviewed in July-August, 1982, individually by an interviewer. The teachers of the children, again individually with the interviewer, filled in a set of expectations for the children's performance at the end of the year, using exactly the same format for answers as the children. Teachers were not, of course, informed of the children's expectations.

Children and teachers were asked to rate, on a ten point scale, ranging from 1-10, the mark that they expected to get (or expected the child to get) at the end of the year in tests administered by the Mt Druitt Longitudinal Study in Reading Comprehension, Spelling, Mathematics, and Written Expression. Care was taken to ensure that the child understood what the tasks were and when they would be given. Teachers were asked to assess the children in relation to their classmates, rather than as members of a sample of wider abilities.

RESULTS

It was hypothesised that high achievers would have high expectation for success on the assessment tasks given at the end of the year, and that there would be reflected in high predicted marks in reading, spelling, mathematics and written expression. Conversely, low achievers, were expected to predict lower levels of success than the high achievers. Children were asked to predict "out of 10", the mark they would get at the end of the year on reading, spelling, mathematics and written expression. The data were analysed to investigate possible differences in expectation between girls and boys, where, on the basis of previous research reported in the literature, any significant difference obtained was expected to indicate lower expectations for success in girls. Similarly, teachers were expected to predict higher marks at the end of the year for high achievers than low achievers. It was not anticipated that there would be any differences in teachers' expectations for boys and girls.

It was also expected that high achievers would have higher expectations for academic success and that their prediction would be more accurate, i.e. closer to their obtained scores than the predictions of the low achievers. The greater variability among the low achieving group in performance in test in 1981 in reading and mathematics, strengthened this expectation. Accurate prediction seemed an easier task from the consistently high performance base shown by the high achievers, than the more variable performance base of the low achievers. It was not expected that there would be any difference between boys and girls in accuracy of prediction.

Teachers were expected to be more accurate than the children in their predictions of the end of year performance of the sample. Teachers' predictions were expected to be accurate regardless of the achievement level or sex of the children.

At time of writing, a full set of data, i.e. children's and teachers' predictions and obtained scores were available only for Reading, and these data were analysed by MANOVA. For the remaining curriculum areas spelling, mathematics and written expression, differences in children's and teachers' expectations were analysed separately using separate samples t-tests.

The data on children's predictions, teachers' predictions and reading scores were analysed by 2 x 2 MANOVA. There was a significant main effect for achievement (F = 59.2, df = 3/49, p = .000) by Wilks' Lambda criterion. The multivariate values for sex (F = 2.46, df = 3/49, p = .073) and for the interaction of achievement and sex (F = .879, df = 3/49, p = 0.458) were not significant.

The univariate tests of significance for the main effect for achievement are set out in Table 1.

Table 1

Achievement Differences In Expectations and Performance in Reading

Dependent Variable	Univariate Tests of significance		
	df	f	p
ACER Comprehension	1/51	179.02	0.000*
Children's Prediction	1/51	0.04	.836
Teachers' Prediction	1/51	35.50	0.000*

As expected, high achievers obtained significantly higher scores than low achievers on the standardised reading test. This result confirms the accuracy of the sampling process used for the study. Teachers predicted significantly higher marks at the end of the year for high achievers than low achievers. This result was also expected. However, there was no significant difference between the expectations of high achieving and low achieving children for reading performance.

The data relating to both children's and teachers' expectations for high and low achievers, and boys and girls in curriculum areas other than reading, were analysed by a two samples t-test. There was no difference in expectations between high and low achieving children on any of the curriculum areas tested,. (Spelling t = 1.42, p = .160, mathematics t = 1.40, p = 1.66; written expression t = 83, p = .412). Teachers distinguished very clearly between high and low achievers in their expectations for success. Significantly higher expectations were expressed by teachers for high achievers than low achievers in all curriculum areas. (Spelling t = 5.80, p = .000, mathematics t = 5.06, p = .000; written expression t = 4.62, p = .000). There were no differences in teachers' expectations for boys and girls.

It is worth noting that, while the multivariate tests for sex as a main effect were not significant, the univariate analysis indicated that there was a significant difference in children's expectations for reading, where girls had significantly higher expectations than boys (F = 6.41, df = 1/51, p = .014).

At time of writing, end of year scores were available only for reading, and data showing the accuracy of teachers and children's predictions in relation to obtained scores in reading are presented in Table 2.

Table 2
Accuracy of Predictions for Reading: Children's and Teachers'

Group	N	Childrens		Teachers	
		r	p	r	p
Whole group	60	.0134	.461	.6701	.000*
High Achievers	30	.3999	.014*	.6886	.000*
Low Achievers	30	-.2064	.161	.6778	.000*
Boys	30	.0667	.371	.4291	.009*
Girls	30	-.0398	.420	.2156	.150

These results indicate that high achievers were significantly more accurate in predicting their end of year than were low achievers. This result was in the expected direction.

Generally, teachers predicted very accurately the scores obtained by the whole group in reading (r = .6701, p = .000). The correlations obtained for both the high and low achieving groups were highly significant. The teachers were least accurate in predicting girls' end of year reading scores; a result which was not predicted. Examination of the data indicated that, while teachers predicted that low achieving girls would obtain higher scores than the low achieving boys in the reading test, the reverse result occurred.

From the results already presented, it would be predicted that there is a closer match between the expectations of the high achievers and their teachers than between the low achievers and their teachers. The Pearson Product Moment correlations for this data are shown in Table 3.

Table 3

Teachers' and Childrens' Predictions

Curriculum Area	High Achievers (N=30)		Low Achievers (N=30)	
	r	p	r	p
Reading	.3715	.022*	.0494	.398
Spelling	.3990	.014*	-.0173	.464
Mathematics	.6615	.000*	.3330	.036*
Written Expression	.2815	.066	.1098	.282

The relationships between teachers and children's expectancies were significant for reading, spelling and mathematics for high achievers, and for mathematics for low achievers. High achievers had expectancies more closely matched with the teachers than low achievers. This is shown by the higher "r" obtained by high achievers than low achievers in all subject areas.

However, the match of the low achievers expectations for their result in mathematics with the expectations of their teachers reached significance. It appears that low achievers had a more realistic appraisal of their level of performance in mathematics.

Two factors may be influencing this result. Firstly, the feedback given for mathematics is often a concrete piece of information, a mark, which can be precisely verified by the child. It is hard to be mistaken about the level of peformance obtained in mathematics. Secondly, the mathematics test used was a criterion referenced test, which the whole group, but especially the low achievers, might have recognised as being very similar to the exercises done routinely in class.

DISCUSSION

From the results presented in this study of Year 4 children, both high and low achievers expect to get high marks in assessment tests given at the end of the year in reading, spelling, mathematics and written expression. Other researchers (Entwisle and Hayduck, 1978) have found that low achievers on beginning school and at the end of Year 2 have very high expectations for success at school, even if in the meantime they have received low marks. This study has found that their high expectations endure to at least year 4.

High achievers appear to be better attuned to the feedback that forms expectations, i.e. the school, the teacher and their own performance. Their accurate predictions for their end of year mark and the close relationships that their expectations have with those of their teachers indicate their accurate, tightly formed evaluation of performance at school. They have formed the beginnings of an accurate cognitive map of school processes and the information that they convey to them.

The low achievers, on the other hand, have unrealistically high expectations for their success at school. The process of sample selection showed that low achievers have a variable range of performance in reading and mathematics, i.e. they did not necessarily get low marks in both. Some low achievers would realistically expect to get higher marks in some subjects than others.

However, their expectations were extremely high, higher than this explanation would suggest. It is interesting that the low achievers' predictions were closest to their teachers' on the mathematics test which is a criterion--referenced test. Reading performed was assessed by a norm-referenced test. It appears that low achieving children are more readily able to assess their performance on tasks directly related to classroom content for which there is concrete feedback. Although many of the low achievers in this sample do end of year norm-referenced tests they may not be given feedback in a form that helps them assess their performance realistically. Perhaps they are not given feedback at all on this type of task.

At what point in their school careers do the low achievers come to have a more realistic assessment of their abilities to perform at school? Perhaps a change begins to occur when low achievers are forced to accept their low performance on tests that all children in their age/grade level complete, i.e. either yearly examinations or standardised tests. At secondary school, their results are usually known to the students who can make direct comparisons. Removed from the assessment framework of the primary classroom, the existence of a wider range of abilities becomes obvious.

The literature suggest that the formation of children's expectations is a complex process involving teachers, parents and perhaps other children. It is in the children's interests to have a realistic set of expectations which can motivate constructive efforts to improve academic performance at school. There is a role for teachers in assisting children develop these important understandings, by developing methods of feedback which help the children understand the level of their performance, and develop realistic goals and work patterns to achieve them.

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RELATIONSHIPS BETWEEN FAMILY CHARACTERISTICS AND PRIMARY SCHOOL RELATED OUTCOMES

Measures of the family's social environment for children have been found to account for a greater proportion of the variance in the outcomes of tests of intellectual ability and school achievement than any single variable or variable set other than that accounted for by parent ability - child ability relationships. Indeed, in the sixties and seventies a major criticism of the ability of schools to create environments which promoted and sustained learning was fuelled by evidence from a series of major studies of the overpowering effects of family background and family environment upon children's achievement measures. The Equality of Education Opportunity Survey in the United States, for example, raised serious doubts in 1966 about the ability of the school to contribute to student achievement while evaluations of Head Start and Follow Through type programs, both in the United States and here in Australia, have demonstrated the inability of schools to produce sustainable effects over and above those related to the child's home background and parental ability.

Despite the long-term and wide-spread recognition of the importance of the family for children's achievement it is a fact, however, that "a relatively small number of educational researchers have included detailed assessments of family environments in analyses of children's school outcomes" (Marjoribanks, 1979:1). Studies which have investigated family environments have often been marred in the past by small samples, with 60 being the most common sample size, or restrictions to the range of characteristics represented within the sample. Generalizations from such studies have been limited and Marjoribanks (1979:45) has shown that with larger samples the moderate to high relationships between the family environment and achievement measures of the small sample studies are not replicated. In a larger scale study with a sample of 918 Australian families Marjoribanks (1979:56) was able to show only modest associations "although the relationship of social background measures with academic achievement scores were strongest, while the relations to intelligence and affective characteristics were of a lower order". It may be that in some circumstances the proportion of variance in school related achievement test scores over which the School has some influence could be greater than suggested by earlier studies with family background proving a relatively weaker predictor.

Marjoribanks in his 1979 study and in earlier studies made a distinction between, what he termed, "environmental forces" and other environmental measures such as social status indicators and family structure variables. Bloom (1964) had earlier defined the environment as "the conditions, forces and external stimuli that impinge upon the individual" and had conceived of various sub-sets of the total environment, or "sub-environments", which act upon specific human characteristics. Presumably Marjoribanks' use of the term "environmental forces" overlaps with Bloom's and the terms social status and family structure indicators can be equated with Bloom's use of the term conditions. Of particular interest in family or school environment-achievement relationship research is the identification of those sub-environments, those environmental forces and conditions, which help to shape the child's learning.

The Mt. Druitt Longitudinal Study, of which this research formed part, included in its sample children from a wide variety of home backgrounds. Tracing the effect of these environments upon school performance was an important element in a study which was attempting to delineate how "disadvantage" functioned for Australian children. Included in the Longitudinal Study sample were children, for example, from poverty or from single parent families or of

Aboriginal descent or of migrant backgrounds, as well as children from advantaged circumstances. Identification of any effects upon academic performance or affective development of sub-environments related to such background characteristics was of importance if children's academic or personal growth were to be maximised. Burns and Brassard (1982:487) have claimed, for example, that children from single parent families suffer "an increased risk for ... poor academic achievement", basing their claim on the children's experience of "higher levels of anxiety, especially as the result of financial difficulties".

Approximately one third of the total Mt. Druitt Longitudinal Study sample of children came from families whose sole source of income was from social welfare payments and who lived, therefore, with incomes below the recognised Australian poverty line. Following upon Burns and Brassard's reasoning it might be expected that all these children would be "at risk".

Although general, broad measures of parental income levels and occupational status have been shown, as Burns and Brassard claim, to be related positively and consistently to children's achievement, measures of specific home environment forces (or factors or processes; terminology, although interchangeable, appears to depend upon the personal predilection of the individual researcher) have been shown to be more strongly related to achievement (e.g. Bradley, Caldwell and Elardo, 1977:699). It was the environmental processes which make up the "learning sub-environment" which were of special interest in the Mt. Druitt Longitudinal Study, as even within the Mt. Druitt located subsample, chosen for their homogeneity upon social status or social condition measures, a wide range of achievement outcomes could be noted. Such variation may be amenable to explanation given information with regard to environmental forces or processes established within the children's family or school environments. Could it be that high achieving Mt. Druitt children, from disadvantaged, low social status backgrounds, share specific home processes with high achieving pupils from non-disadvantaged backgrounds? Or, might it be that with some children the school's role is a more important one?

Marjoribanks (1974:128) has identified a set of eight home related environmental forces from a review of the relevant literature, which he postulated were related to child school performance. Six of these forces were labelled as presses, including press for achievement, activeness, intellectuality, independence, English, and home language other than English. The remaining two forces were named as father dominance and mother dominance. In studies of the relationship of these eight forces with achievement a structured interview was employed by Marjoribanks to elicit reponses from both parents and each item was scored - in a relatively subjective fashion - by the interviewer so as to produce a score for each of the environmental forces.

Of the status factors or environmental forces for which measures became available in the Mt. Druitt Longitudinal Study, significant correlations were found for all but parental aspirations, when Marjoribanks related these variables to achievement measures in two studies. In a reworking of data collected for the Plowden Committee in the United Kingdom, or in original studies in Canada and Australia. Marjoribanks found relationships illustrated in the Table below.

Table 1

Correlation Coefficients for Social Status and Family Environment Measures Related to Achievement Measures

Variable	Study	Verbal Measures	Numerical Measures
Father's Occupation	Plowden	.36	.33
	Marjoribanks '74	.29	.27
Father's Education	Plowden	.33	.32
	Marjoribanks '74	.43	.30
Ethnicity	Marjoribanks '74	.35	.21
Housing (includ. crowding)	Plowden	-.28	-.20
	Marjoribanks '74	-.34	-.34
Press for Achiev.	Marjoribanks '74	.66	.66
Press for Intell.	Marjoribanks '74	.612	.53
Parental Aspiration	Marjoribanks '74	.06	.08

The correlations recorded for the environmental forces (.53 to .66) clearly are greater than those for the conditions (.20 to .35) as had been suggested.

Given the size of the sample within the Mt. Druitt Longitudinal Study (some 900 children and their families) plus the necessity to establish a set of information for each family it was not possible to conduct lengthy interviews with each parent. Within a questionnaire, modelled to some extent on Marjoribanks' structured interview, it was possible, though, to tap out social conditions and some important aspects of the home environmental forces. Questions had to be limited to those which could elicit a direct response from the responding parent, however, as questions permitting interpretation may have produced a variety of unknown shifts in meaning in the responses given. A questionnaire, developed in the first instance as a structured interview with later transformation into a self-administered instrument, was adopted to elicit information with regard to social status indicators, family structure characteristics, ethnicity and the environmental forces of family expectations and family intellectuality. All five factors had been shown by previous research to be related to child achievement and/or affective measurement scores. The model being pursued in the Mt. Druitt study, in which social status and social-psychological family environment variables were being related to cognitive and affective outcomes, was an example of one possible model for research on family background-school related outcome relationships. Marjoribanks (1979:55) had identified six possible models.

Of great interest within the Mt. Druitt Longitudinal Study was the identification for Australian children of the meaning and functioning of "disadvantage". In pursuit of this interest the patterns of relationship for two sets of children, the Mt. Druitt children and those from non-disadvantaged backgrounds, could be compared, and the pattern of relationships for the higher achieving children in Mt. Druitt compared both to the general Mt Druitt pattern and that of the non-disadvantaged children in an attempt to identify any differences in the patterns of relationships.

It was hypothesized that the strength of relationship between social status indicators, family structure characteristic, environmental forces and school achievement depends on the socio-economic status of the sample. It was expected that low socio-economic status children's achievement might not be as closely related to social status and family structure factors as it is with higher socio-economic status children and could therefore, provide an opportunity for the school to have greater influence upon child achievement.

Method

The data used in this study were collected in 1981 as part of the Mt. Druitt Longitudinal Study (MDLS). The child sample comprised the entire Year 3 cohort at seven state primary schools in New South Wales. Five of the schools, all located in the Mt. Druitt area forty kilometres west of the Sydney Central Business district, had previously been participants in the Mt. Druitt Early Childhood Project (MDECP) between 1977 and 1980. In 1981 the MDECP was increased by the addition of three "contrast" schools to become the MDLS sample. Data are included in this report from two of these contrast schools, one being located 55 kilometres west of the Sydney Central Business district, the other a mere five kilometres across the harbour from the city centre. In general terms Mt Druitt is a low socio-economic status area where mean school achievement levels are low, while the two contrast schools are in higher socio-economic status areas and mean school achievement levels are high. The Mt. Druitt and Contrast samples are discontinuous with respect to school achievement levels; this fact persuaded the researchers not to pursue structural analyses (such as path analysis) of the data sets combined.

Four achievement tests and one measure of locus of control were administered to over eight hundred children and a detailed home environment questionnaire was sent home to their parents. Despite an excellent overall response rate from parents of approximately 70 per cent, complete data sets were available for only 278 children. The reduction in numbers arose largely from the failure of many parents to answer all the items in their questionnaire.

The final sample included in the analyses comprised 192 Mt. Druitt children and 86 contrast children, both sets having approximately equal numbers of boys and girls with an average age of nine years.

The four achievement tests administered were a custom designed criterion referenced test of mathematics (covering the content of the infants' school mathematics curriculum), the ACER Word Knowledge Test and Comprehension Test (both at Level A, Form R) and the Schonell Spelling Test, the latter three being standardised norm referenced tests. The Internalisation of Achievement Responsibility Questionnaire (IARQ) was used to assess the extent to which children accepted responsibility for their classroom related successes and failures.

The home environment questionnaire variables indicating social status were mother's education, father's education, friends' and relatives' education, a crowding index, home ownership, family income and father's occupation. The family structure variables were the intactness of the nuclear family, number of parents living with the child, the number of guardianship changes the child has experienced and the length of time the child has been living in its present circumstances. Intellectuality press indicators included an assessment of the type of newspapers and magazines available in the home, the extent to which the child was and is read to by other members of the family, the child's television viewing habits, the amount of help given with homework, the availability of an encyclopaedia in the home and the frequency with which books are borrowed by the child from a library or friends.

Parental expectations drew together both mother's and father's expectations about present grades, grades in high school and the highest level of education the child would reach.

The ethnicity of the family was judged on the basis of where each parent was born, where each parent was educated, how long the parents had lived in Australia and the number of languages spoken in the home.

The means and standard deviations for each achievement test and the IARQ subscores for successes and failures are shown separately for Mt. Druitt and Contrast schools in Table 2 below.

Table 2

Means and Standard Deviations for Achievement Tests and IARQ Scores

Measure	Mt. Druitt Schools N = 192 $\overline{X}$	sd	Contrast Schools N = 86 $\overline{X}$	sd
Schonell Spelling	39.72	12.62	53.63	11.54
Mathematics	75.89	18.80	93.93	7.60
ACER Word Knowledge	18.32	7.99	30.53	7.11
ACER Comprehension	15.03	6.58	25.56	6.02
IARQ - Success	6.88	1.68	7.69	1.51
IARQ - Failure	5.71	2.12	6.57	2.04

The variance in home environment variables for each group was compared and found to be sufficiently similar to allow a comparison of the zero order correlations between achievement scores and home environment variables for the two groups without fear that one set of correlations may be being reduced by lack of variability. Variances of key home environment variables are given for each group in Table 3 below.

Table 3

Variances for Home Environment Variables for each Group

	Contrast Sample $\overline{X}$	sd	Mt. Druitt Sample $\overline{X}$	sd
Mother's Education	4.52	1.69	6.31	1.06
Father's Education	3.63	1.95	6.15	1.16
Home Ownership	2.00	.41	1.58	.64
Father's Occupation	5.15	3.78	9.97	3.08
Parental Expectations	2.15	1.33	3.43	1.31

The correlations between the gross indicators of family social condition (social status and family structure) and achievement are presented in Table 4 for Mt. Druitt children and in Table 5 for contrast children.

Table 4

Interrelationships Between Gross Indicators of the Home Environment (Conditions) and School Achievement/Locus of Control for Mt. Druitt Sample ($n = 192$)

	Spelling	Maths	Word Knowledge	Compre-hension	IARQ Success	IARQ Failure
Mother's Education	.11	.16	.14	.24**	.05	.01
Father's Education	.02	.07	.04	.12	.03	.00
Education of family friends	-.03	.10	.03	.02	-.08	.08
Education of relatives	.07	.01	.09	.06	.08	-.06
Crowding ratio of home	.09	.00	.09	.04	.04	.06
Home Ownership	.18*	.21*	.24**	.28**	.13	.00
Family Income	.09	-.02	.10	.00	.00	-.02
Father's Occupation	.17*	.14	.18*	.19*	.10	.06
Nuclear Family	.08	.03	-.01	-.13	-.03	.00
Number of parents	.04	-.12	.05	.04	-.05	-.12
Number of guardianship	-.06	.00	.02	.14	.07	.03
Time in present family	-.03	-.08	.03	.11	.00	-.08

* $p < .01$
** $p < .001$

Table 5

Interrelationships Between Gross Indicators of the Home Environment (Conditions) and School Achievement/Locus of Control for the Contrast Sample (n = 86)

	Spelling	Maths	Word Knowledge	Compre- hension	IARQ Success	IARQ Failure
Mother's Education	.24	.19	.30*	.33**	-.08	-.09
Father's Education	.24	.31*	.35**	.40**	-.05	.08
Education of family friends	.24	.28*	.30*	.30*	.04	.11
Education of relatives	.15	.11	.23	.25*	.08	.08
Crowding ratio of home	.20	.22	.12	.20	.04	.21
Home Ownership	.08	.10	.08	.13	-.08	.20
Family Income	.08	.08	.01	-.01	-.11	.09
Father's Occupation	.22	.32*	.38**	.39**	.04	.16
Nuclear Family	.06	.28*	.05	.04	.20	.09
Number of parents	-.02	.10	-.06	-.09	.22	.10
Number of guardianship	.06	.28*	.05	.04	.20	.09
Time in present family	.14	.31*	.08	.12	.04	-.03

* $p < .01$
** $p < .001$

It should be stated that none of the relationships for either group is strong with correlation coefficients for the Contrast group reaching about the same level as Marjoribanks had found earlier in Australia although the coefficients for the Mt. Druitt children are much lower with fewer reaching significance.

Contrast Schools

For children in the contrast schools father's education, mother's education, father's occupation and parental expectations, themselves interrelated, show the strongest relationships with achievement.

Table 6

Strongest relationships for Contrast Schools

	Father's Education	Mother's Education	Father's Occupation	Parental Expectations
Schonell Spelling	.24	.24	.22	.30*
Word Knowledge	.35**	.30*	.38**	.49**
Comprehension	.40**	.33**	.39	.44**
Maths	.31*	.19	.32*	.21
Parental Expectations	.49**	.37**	.38**	
Father's occupation	.55**	.41**		
Mother's education	.54**			

The correlations in Table 6 are very similar to those reported by Marjoribanks (1974). Mother's and father's education bear a similar relationship to three of the four achievement measures (Spelling, Word Knowledge and Comprehension) but father's education is more strongly related to mathematics achievement than is mother's education. The intactness of the nuclear family moreover, makes no difference for spelling, word knowledge or comprehension (all correlations very close to zero) but is significantly related to maths achievement (see Table 5).

Father's help with homework is negatively related to word knowledge and comprehension, i.e. the more the father helps, the lower the achievement. This is perhaps explained by assuming that fathers do not usually help with homework, but are more likely to do so if the child is not doing well at school.

Mt. Druitt Schools

The significant relationships are fewer and weaker for children in the Mt. Druitt sample compared with those for the contrast children and with Marjoribanks' findings.

Mother's education, father's education and father's occupation are still interrelated but of these, for this group, mother's education only is related to parental expectation.

Table 7

Strongest Relationships for Mt. Druitt Schools

	Father's Education	Mother's Education	Father's Occupation	Parental Expectations	Home Ownership
Schonell Spelling	.02	.11	.17*	.19*	.18*
Word Knowledge	.04	.14	.18*	.30**	.24**
Comprehension	.12	.24**	.19*	.32**	.28**
Maths	.07	.16	.14	.32**	.21*
Home ownership	.30**	.17*	.27**	.07	
Parental Expectations	.07	.23**	.13		
Father's Occupation	.37**	.26**			
Mother's education	.44**				

Parental expectation is related to the children's achievement, almost to the same extent as it was for the contrast group, but of the other three (mother's education, father's education and father's occupation), which were as strongly related to achievement as parent expectation for the contrast group, only father's occupation shows a significant correlation with achievement and even that is at a very much lower level.

Home ownership, related to both parents' education and to father's occupation is also related to achievement, but not to parental expectation. There are three categories of home ownership, renting, buying and owning outright; in Mt. Druitt renting can be equated with "housing commission". It may be hypothesised that these Mt. Druitt families who chose to buy or who have bought their property may also create home environments which differ from Mt. Druitt families content to rent their homes.

Parent expectation is related to ethnicity, migrant parents having higher expectations for their children than Australian born and educated parents. These higher expectations are not matched, however, by their children's achievement levels as is evidenced by the lack of relationship between ethnicity and children's achievement.

Table 8

Interrelationships Between Measures of Family Ethnicity and School Achievement

	Where mother was born	Where father was born	Where mother educated	Where father educated	Number of languages spoken	Parental Expectations
Spelling	.10	.11	.06	.06	.11	.19*
Word knowledge	.06	.07	.06	.05	.07	.30**
Comprehension	.09	.05	.01	.00	.02	.32**
Maths	.10	.06	.05	.03	.05	.32**
Parental Expectation	.26**	.32**	.20*	.21*	.24**	

The discrepancy between the degree of relationship between mother's and father's education and children's maths achievement observed in the contrast group is not present for the Mt. Druitt group. The intactness of the nuclear family is similarly unrelated to maths achievement for this group. This is, of course, a most important finding. Children from single parent families do not, despite evidence from the United States, appear to suffer detriments in their educational achievement. Conversations with single parents in both Mt. Druitt and the contrast school groups leads to a suspicion, however, that the children's success may be being bought at the expense of their parents' opportunities to relax and their freedom from anxiety.

Mother's help with homework is negatively related to spelling and word knowledge as was father's help for word knowledge and comprehension for the contrast group. Again this may well reflect mothers helping children because they are not coping at school.

For neither group was there any relationship between children's achievement levels and crowding index of home, family income, single versus two parents, ethnicity of parents, being read to by either parent, the newspapers available in the home or the amount of Television viewed before or after school each day.

Locus of control (IARQ) was unrelated to any of the other measures for the contrast group and was related to achievement only for the Mt. Druitt group.

Table 9

Relationship between IARQ and Achievement

	IARQ - Successes		IARQ - Failures	
	Mt. Druitt	Contrast	Mt. Druitt	Contrast
Spelling	.28**	.12	.19*	.24
Maths	.33**	.12	.15	.10
Word Knowledge	.32**	.06	.15	.02
Comprehension	.38**	.09	.19*	.10

It is clear that for Mt. Druitt children, home environment as measured by social status indicators, plays a much smaller role in determining school achievement levels as measured in this study. A proportion of the Mt. Druitt children (those in "A" stream classes) are achieving at levels quite comparable to those in the contrast schools (see Table 11) but still have family characteristics closely matching those of the total Mt. Druitt sample. It would appear that schools may be far more important in determining relative achievement levels for "disadvantaged" children in the sample than was the case for advantaged children. This may also explain the stronger relationship between IARQ and achievement for Mt. Druitt children than for contrast children. The home environment effects for contrast children appear to be "overriding" any relationship between IARQ and achievement whereas the higher achieving Mt. Druitt children are those who have also internalised to a greater degree a sense of responsibility for their own achievement. The higher achieving Mt. Druitt children share the internalisation of responsibility to the same level as the highest achieving children in the contrast school.

Table 10

Comparison of Achievement Levels and Family Background Characteristics for Mt. Druitt "A" Stream, all Mt. Druitt and Contrast Schools.

	Mt. Druitt All n = 192		Mt. Druitt "A" Streams n = 66		Contrast n = 86	
	$\overline{X}$	sd	$\overline{X}$	sd	$\overline{X}$	sd
Spelling	39.72	12.62	51.06	11.39	53.63	11.54
Maths	75.89	18.80	88.82	13.12	93.33	7.60
Word Know.	18.32	7.99	25.94	5.28	30.54	7.11
Comprehen.	15.03	6.58	20.74	5.39	25.56	6.02
IARQ-Success	6.88	1.68	7.77	1.39	7.69	1.51
IARQ-Failure	5.71	2.12	6.36	2.07	6.57	2.04
Mother's Education	6.31	1.06	6.17	1.09	4.52	1.69
Father's Education	6.15	1.16	5.99	1.22	3.63	1.95
Father's Occupation	9.97	3.08	8.96	3.17	5.15	3.78
Parental Expecations	3.43	1.31	3.09	1.38	2.15	1.33

The similarity of the high achieving Mt. Druitt children on the IARQ measure to children in the outer city higher socio-economic status area particularly is of great interest. Although these outer city children were the highest achieving in the sample, and came from expensive, well-resourced homes, their parent's levels of education achievement was only slightly higher than that of Mt. Druitt parents. These outer city families were classic examples of "upwardly socially mobile" groups, determined and persistent in their endeavours to succeed. The achievements of the children of these homes, but not their acceptance of responsibility for their successes and failures, were related to both their social condition and an environmental force; parental expectations. For the Mt. Druitt high achieving children neither their achievements nor their acceptance of responsibility were related to either social conditions or family environmental force, as measured. The pattern of the relationships of the IARQ responsibility measure with achievements differed for the two groups of children, with IARQ successes and some IARQ failures being related significantly to achievement in Mt. Druitt although there were no such relationships with the outer city higher socio-economic status group of children. One positive interpretation of these findings might be that the school experience of higher achieving Mt. Druitt youngsters is very important to their success and acceptance of responsibility while the home experiences and family background of the outer city children is sufficient to sustain high levels of achievement. Of course it might also be the case that unmeasured aspects of the children's family-based experience is of equal importance to both groups. It is certainly the case, however, that within the Mt. Druitt "disadvantaged" groups of children a different pattern of interrelationships between the variables of interest in the study were found when compared to non-disadvantaged groups elsewhere. It is also the case that within Mt. Druitt a substantial group of competent youngsters were identified and these children, sharing a similar social background and environmental circumstances as measured with lower achieving Mt. Druitt children, could also be distinguished by their greater measured acceptance of responsibility for success and failure. For the majority of children within the total Longitudinal Study sample home background characteristics are vital for their observed level of achievement; for one substantial group of higher achieving Mt. Druitt children, however, school experience appears to be particularly important as well.

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HOW WELL DO SCHOOLS SERVE DISADVANTAGED PUPILS?

Educational disadvantage as a consequence of social, economic or geographic deprivation or from ethnic or gender related causes, has been identified as a focus for special ameliorative action in Australian education. The Australian Schools Commission, for example, was "required to consider the need for improving the quality of existing school provision and to promote equal and increased educational opportunities". In the sense that the term is referred to by the Schools Commission disadvantage may be presumed to exist if discrepancies are found between school related achievement levels for different school populations. Divergence between the mean achievement levels of sub-groups of Australian children have, indeed, been identified. The Australian Council for Educational Research, for example, when piloting achievement tests in Australian schools in the late sixties and early seventies, identified "differences in achievement ... between the States and between metropolitan and country children in any one state" (ACER, undated:6). In other Australian studies de Lemos (1975), the New South Wales Department of Education (1976) and Turney, Sinclair, Inglis and Stratton (1978) had identified achievement differences in primary school favouring children from English speaking homes over those who came from a home where a language other than English was used.

It has been accepted generally that schools have little control over the entering characteristics of new students. From a given starting point, however, the school may be expected to exert a positive influence upon the pupils it accepts in order to enhance their development and to promote learning. In this way the school may be held responsible somewhat for the outcomes of education although it is well known that these may be easily and accurately predicted simply by knowing the characteristics of the neighbourhood from which the school's population is drawn. On the other hand if it were to be found that the achievement of disadvantaged school pupils, relative to more advantaged peer groups, diverged increasingly as the children moved through school there is potential evidence in such a finding that schools might not be providing optimal learning environments for disadvantaged pupils.

In the Schools Commission Report for the Triennium (1976-1978) it was claimed (p.225) that, "the schools serving the most socially deprived neighbourhoods were in general ... those most accepting of educational failure". Additionally, the Schools Commission identified low aspiration levels, disaffection, alienation and powerlessness as further outcomes of the schooling of disavantaged pupils. To accuse those Australian schools serving the disadvantaged, who commence their formal schooling considerably less advanced than other pupils, both of complacency and inaction is a particularly harsh criticism which questions the personal attitudes and professional ability of the Principal and teachers of such schools and the public policy which permits such a situation to exist. Can it be ascertained, however, whether Australian primary schools serving disadvantaged pupils do, indeed, serve them poorly?

Growing divergence between pupil groups, with those children beginning school with higher levels of achievement pulling further ahead over time, has in fact been noted in studies in the United States, Great Britain, and the Republic of Ireland as well as here in Australia.

In Table 1 are summarised the results of studies reporting data relevant to the question of accumulating deficit in school achievement. All studies report mean achievement scores of pupils on standardized tests of achievement at several grade levels, with primary school grades predominating with the majority of studies cited being cross-sectional in nature. In such studies pupils at various grade levels are measured on a single occasion with inferences then being drawn with regard to the probable course of development of achievement over time. Such studies cannot eliminate the possibility of conflicting, multiple causation for no experimental control over potentially important events unrelated to school can be exercised given such a methodology. Three of the twelve studies were, however, designed as longitudinal studies in which a group of students were observed on several occasions, typically a year apart, over several grades. While greater certainty that school related causes of achievement may be validly identified given a longitudinal design a weakness still exists in the methodology of these three as a single student cohort was observed in each of the studies. Experiences unique to, and influencing the achievement of, a single cohort may be hypothesised, suggesting that great care should accompany the interpretation of the results of these three studies.

Table 1

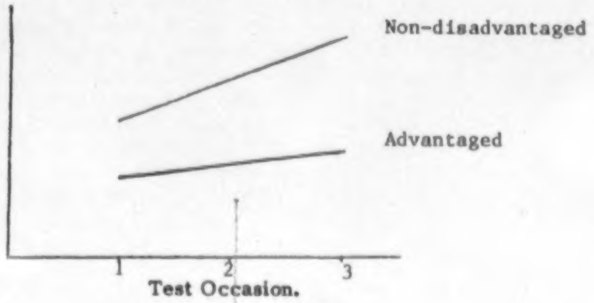
Studies of Accumulation of Deficit in School Achievement

Study	Location	Year	Sample	Design	Grade	Verbal Ach.	Reading	Maths Ach.
Coleman	U.S.A.	1966	ME	CS	6 to 12	-*	-	
Jensen	U.S.A.	1974	ME	CS	1 to 3	-	-	-
					4 to 8	n.d.	n.d.	n.d.
deLemos	Aus.	1975	ME	CS	4 and 6	-	-	
Moon	U.S.A.	1975	ME	CS	2,4,6			-
Becker & Engleman	U.S.A.	1976	ME	L	3 to 6	-	-	-
ELAN	Aust.	1976	Anglo	CS	5 and 8		-	-
Little	U.K.	1977	Anglo	CS	2 to 5		n.d.	
Cemrel	U.S.A.	1978	ME	L	1 to 3		+ Negro** - Hispanic	
Turney _et al._	Aust.	1978	ME	CS	4 to 8		n.d.	
Holland	Ireland	1979	Irish	L	1 to 5		-	
Turney _et al._	Aust	1980	Anglo	CS	4 to 8		n.d.	

*	minus signifies accumulating deficit,
**	plus signifies decreasing deficit
CS	cross-sectional
L	longitudinal
ME	multi-ethnic

The typical pattern divulged by the Table is for the mean achievement scores of the groups being compared to diverge over time. Both the disadvantaged and the criterion, or contrast, pupil groups in these studies did achieve greater scores on achievement tests over time although the rate of learning was apparently slower for the disadvantaged group. If graphed the typical pattern of achievement over time would appear as in Figure 1.

Figure 1
Mean Achievement Levels of Disadvantaged and Non-disadvantaged Pupils on Three Testing Occasions over Time



Of the 22 results reported in Table 1 only one, in the Cemrel 1978 study, indicated a narrowing of the mean achievement gap over time. Of interest also in this study was a contrary finding for the Hispanic pupil group which progressed at a slower rate, compared both to the Negro group and to the Anglo groups in the Sample. Results of the four Australian studies were inconsistent, with two findings of no significant difference in rate of learning and two findings reporting an accumulating deficit. Additionally, the Australian studies were cross sectional in design, not the strongest methodology for researching the question of accumulation.

Hypothetical causes of accumulating deficit range from those inherent in the pupil and, perhaps, genetically determined to those under the control of the teacher, being environmental in nature. Suggested causes include:

a) differential rates of mental maturation (Jensen, 1974);

b) the effects of these maturational lags on the pupils' ability to succeed on tasks with changing factorial composition (Jensen 1974:218);

c) pupil disillusionment (Jensen 1974:218);

d) waning motivation for school work (Jensen 1974:218);

e) fear of failure (Cross 1971:23);

f) the threat of possible success (Cross 1971:23);

g) low self-esteem (Clements 1978:4);

h) prior learning insufficient to promote success with later learning tasks (Jensen 1974:212; Becker and Engleman 1976:1).

While the first and second cause may be seen to reflect inherent characteristics over which the school could have little or no control, consideration of the remaining six causes suggests that action taken by the School to prevent or counteract these may enhance the performance of pupils in their care. The school, then, may be held somewhat responsible for any growing deficit which disadvantaged pupils experience.

In a broader sense, of general underachievement rather than of the progressive achievement gap, disadvantage has been conceptualised into explanatory theories which may be typified as deficit theories, (in)competence theories, difference and school inadequacy theories and resource (power and politics) theories. In the first of the Australian School Commission Reports, that of 1973 which has become widely known as the "Karmel Report", the weight of the Commission was thrown behind the difference explanation of disadvantage and schools were exhorted to make their curricula "relevant" to different groups of students. The Karmel Report (p20,p21) urged that "an alternative explanation for the apparent lack of importance of school factors in influencing pupil performance might be that schools are not sufficiently different from each other in their curricula and teaching methods", and that "schools should not concentrate on merely treating all children alike". Implicit in such statements is the claim that the response of the school to the disadvantaged pupil was inadequate.

The Australian Schools Commission held the view, then, that manipulation of the school environment could create more equal outcomes for the school population, including the disadvantaged. Provision of additional financial resources to individual schools through "special disadvantaged schools grants", disbursed from the Australian Government directly and through the various State Education Departments, was adopted by the Schools Commission as one means of counteracting disadvantage. These grants were the first recognition in Government policy at any level in Australia that non-special schools required different resources according to the character of the population they served. The philosophy behind the grants appeared to accept that it is at the individual school level that decisions as to the spending of such funds are best made. The Commission's confidence in the professional judgements of the individual disadvantaged school teaching staff to spend funds wisely seems rather at odds with the Commission's expressed opinion that such staff are most accepting of the failure of their students. While no major evaluation of the disadvantaged schools grants program has been carried out the fact of its continued operation for ten years since inception implies acceptance of its efficacy, although Connell, Ashenden, Kessler and Dowsett (1982:16) remind us of the relative puniness of the Disadvantaged Schools Program. Presumably, although there is no evidence that it is the case, additional funds available to disadvantaged schools enable them to construct more successful curricula, to practise more impactive instructional strategies, and to surround the pupil with supportive emotional environments. Given these endeavours the school might ensure better preparation for later learning and therefore more successful and more confident learners. Such hypotheses rest, however, on a raft of guesses and intuitions which may or may not be valid.

The question which lay at the focus of the present study was one inquiring whether the schools of the Mt. Druitt area were assisting or failing their disadvantaged pupils. Five Mt. Druitt primary schools formed part of the total sample of eight Sydney primary schools taking part in the Mt. Druitt Longitudinal Study. While a variety of arguments may be constructed with regard to appropriate methods for measuring the impact of the school upon the achievements of pupils the Longitudinal Study employed standardised tests, as had all the studies included in Table 1 and as these were used by the schools themselves to judge their success or failures. The concept of cumulative deficit was employed to assist in judgements of effectiveness of schooling; the basic understanding being that increasing divergence between the mean scores of the Mt. Druitt children compared to children in other schools in the Longitudinal Study, or to Australian children generally may provide evidence of relative ineffectiveness of the school.

Jensen (1974:219) has drawn attention to the distinction that may be made between an absolute and a relative achievement gap: the absolute being reported in terms of raw score units or on an age/grade scale, while the relative gap is reported in standard deviation units which, quite rightly, preserve differences relative to variations within the achievement scores of the criterion group. In the Mt. Druitt Longitudinal Study it was possible to compute a deviation or relative achievement gap score in terms of standard deviation units and it is these which are reported later. The data reported are the first drawn from an Australian longitudinal study, providing, as Jensen (1974:220) suggests, "the least questionable basis for measuring the progressive achievement gap".

The children involved in the Longitudinal Study were first encountered in 1981 as the entire cohort of third graders at eight Sydney schools. Annual measurement of the children's achievements in reading comprehension and vocabulary knowledge has been repeated since that time. Within the sample a smaller group of students had been carried over in the five Mt. Druitt schools from an earlier project in which the children had been involved as early as 1977. The three non-Mt. Druitt schools were located in suburbs spread widely across the Sydney metropolitan area, with two inner city schools and one far-western suburban school. These three schools also contrasted socio-economically with the disadvantaged Mt. Druitt schools.

Mt. Druitt, an area of approximately 90,000 inhabitants with more than 90 per cent of homes provided by the State Government's Housing Commission, lies some 40 kilometres to the west of Sydney's business centre. Residents of Mt. Druitt are amongst the most needy in N.S.W.; to qualify for Housing Commission assistance recipients must qualify as low income earners. In fact, over 40 per cent of the families in the Mt. Druitt Longitudinal Study depend entirely upon social welfare payments. An earlier project in Mt. Druitt, the Mt. Druitt Early Childhood Project, commencing in 1976, saw the development and implementation of five distinct approaches to preschool education. The children enrolled for a full year in preschool in 1977 became a sub-set of the Mt. Druitt Longitudinal Study sample in 1981. Planned intervention, consistent with the theoretical underpinnings of the five preschool prgrams, was continued in the children's Kindergarten and First Grade years. No planned intervention has been implemented since that time, the Mt. Druitt Longitudinal Study aiming to document the development of the children and to describe aspects of their experience.

The total sample of children was tested with two Australian Council of Educational Research (ACER) standardized tests, in word knowledge and reading comprehension, in 1981 and 1982. A smaller group, located in Mt. Druitt, had also been tested in 1980, while an even smaller group had completed the Peabody Picture Vocabulary Test (PPVT) each year since 1978. Results for each testing are reported below.

Australia is a Federation of six states and two territories, each has a separate education system; these are huge and state-wide, centralised systems, with over 45,000 teachers in N.S.W. alone. The provision for the education of children right across each of the States has been remarkably similar in terms of buildings, resources, curriculum and the professional background of the teachers. The most appropriate comparison group against which to judge the effectiveness of the Mt. Druitt schools would have been other schools of the N.S.W. system. Unfortunately, state norms for ACER standardized tests have never been published, despite the fact that state related performance differences have been identified. Comparisons reported here for ACER test mean scores and deviation scores derived from these therefore employ Australian norms rather than state norms. A second ACER test data comparison contrasts Mt. Druitt children with those in the three additional schools in the Longitudinal Study. A within Mt. Druitt comparison is also reported in which those children who experienced the earlier preschool year are contrasted with those who did not. Additionally a comparison of performances on the PPVT is reported for Mt. Druitt youngsters alone.

Results

In the first comparison the Mt. Druitt and Contrast Schools samples are compared to the Australian norms for the ACER tests. Sigma differences, or standard deviation units, are reported for 1981 and 1982.

Table 2

ACER Standard Deviation Unit Differences for Mt. Druitt and Contrast Schools Compared to Australian Norms

	Word Knowledge		Comprehension	
	1981 3rd Grade	1982 4th Grade	1981 3rd Grade	1982 4th Grade
Mt. Druitt	+.21	+.01	+.28	+.07
Contrast	+1.61	+1.45	+1.63	+1.36
Contrast - Mt. Druitt	1.40	1.41	1.44	1.29

Prior to the drawing of inferences from the Table two important points need to be made. First, the fact that all sigma differences are positive should not be taken to mean that all children in the Longitudinal Study are achieving, on average, ahead of the Australian sample on which the tests were normed. The Longitudinal Study measurements were made in October/November, to be consistent with observation in the earlier Mt. Druitt Early Childhood Project, although ACER suggests published norms are best applied to April/May testing dates. October/November norms are not available. Even so, it is probable that the Contrast School children are scoring, on the average, ahead of the scores that might be expected whilst Mt. Druitt children are scoring slightly below the norm expected.

The second point to be made is that the entire sample appears to suffer a relative loss both in reading comprehension skills and vocabulary knowledge over the 12 months testing period. One possible interpretation of this phenomena is that the application of different curricula in the different school systems of the Australian States may have effect, with the test items in the form of the test employed in the second year being less appropriate for N.S.W. pupils generally compared to children elsewhere in Australia.

What is important for the question of whether the progressive achievement gap experience applies to the Mt. Druitt children is that there is no significant change in the relative standing of the Mt. Druitt group compared to the Contrast School groups of pupils. If a progressive achievement gap is being experienced then it appears to apply as equally to the advantaged N.S.W. youngsters as it does to the disadvantaged children.

In another comparison the Contrast School group are used as the criterion against which the Mt. Druitt children's achievement might be assessed. This approach to the question is in line with the suggestions of Jensen (1974) who counselled against state wide or nation wide comparisons in the U.S.A. educational setting. While the organization of education is much less fragmented in Australia, where there are only seven large state-wide education systems compared to the thousands of local education authorities in the United States, acknowledgement of inter-state differences in curricula has been made previously here. Given those differences, an intra-state comparison is appropriate, for the pupils' opportunity to learn may be most alike when pupils within a single system are compared.

Table 3

ACER Standard Deviation Unit Differences for Mt. Druitt Children Compared to Contrast School Children

	Contrast Schools (n=177)		Mt. Druitt Schools (n=447)	
	$\bar{X}$	s.d.	$\bar{X}$	s.difference
1981 Word Knowledge	28.77	7.26	17.55	-1.55
1982 Word Knowledge	31.26	6.94	19.30	-1.72
1981 Comprehension	23.55	6.35	14.48	-1.43
1982 Comprehension	27.10	6.06	17.01	-1.61

Given an intra-state comparison the two groups of pupils do appear to be diverging in the tested abilities. While it may be presumptuous to assume that the disadvantaged pupils are suffering a progressive achievement gap given only two observation occasions the fact is that for both tests the gap is widening significantly.

A comparison drawing scores from at least three observation occasions is possible for a smaller group from within the five Mt. Druitt schools only. This group included chldren both having had preschool experience (n=44) and having had no preschool experience (n=59).

Table 4

ACER Standard Deviation Unit Differences for Mt. Druitt Children Compared to Australian Norms

		Sigma Differences	
		Preschoolers	Non-preschoolers
1980	Word Knowledge	-0.08	-0.2
1981		+0.46	+0.18
1982		+0.20	+0.03
1980	Comprehension	-0.003	—0.38
1981		+0.59	+0.21
1982		+0.30	-0.01

At the end of 1980 the children moved from the 2nd grade, in the Infants School, to the Third Grade in the Primary School. For the total sample this move may have been accompanied by more rapid development in the skills tested as the mean sigma difference scores for both groups displayed an underlying increase in the mean achievement level relative to Australian norms. By contrast the twelve month period after 1981 testing saw both groups lose ground relative to the Australian norms. Interpretation of the sigma difference is complicated again, however, by the change in available norms from October/November 1980 to April/May in 1981 and 1982 despite the testing of the children in October/November in each year. Both the preschool group and the non preschool group do appear to be losing ground when compared to Australian norms, although it is worth noting that the yearly changes in the sigma differences for the preschooler group (+0.38, - 0.26) (+0.58, -0.20) do not differ significantly from those of the non preschool group (+0.20, -0.15) (+0.59, -0.20).

Whether or not there is a consistent divergence over the three years is impossible to judge given the problem of the changing norms for these tests. It is clear from each of the three Tables (2,3,4) that a decrease has occurred in the sigma difference score in the twelve months 1981 - 1982 indicating a lower mean score for each sample. Although a decrease was noted with both advantaged and disadvantaged youngsters there is one indication (in Table 3) that the disadvantaged children may be progressing less rapidly in the tested areas than their advantaged peers. By the end of the 1983 school year three observations employing ACER tests will have occurred, giving an opportunity for a better assessment of the progressive achievement gap hypothesis. While clearer guidance will be then available it is appropriate to issue a warning at this stage that a progressive achievement gap may be being experienced.

In 1978, when the children of the Mt. Druitt Longitudinal Study Sample who are now in 5th Grade were to be found in Kindergarten, a group of children in the five Mt. Druitt schools were first tested with the Peabody Picture Vocabulary Test (PPVT). Each year since that time children remaining in the schools from the first testing occasion have been retested with the same instrument at one yearly intervals.

Table 5

PPVT Standard Deviation Unit Differences for Mt. Druitt Children Compared to American Norms

Grade	N	Preschoolers	N	Nonpreschoolers
K	98	-.41	30	-.48
1	67	-.47	30	-.51
2	67	-.19	30	-.50
3	67	-.04	30	-.52
4	67	-.38	30	-.53

A change in the PPVT norms provided by Dunn occurred in 1981. It is best, under that circumstance, to interpret Table 5 in two sections (K-1-2 and 3-4). For the preschooled group a progressive achievement catchup (or sigma convergence) appeared to be experienced over the three years in the infant school (K-1-2) although a diverging gap appears in the Table over the initial Primary (3-4) grades as had been seen in each of the three previous tables reporting ACER achievement test scores. The performance of the non-preschooled group is notable for its relative stability with neither a significant convergence or divergence in their scores appearing either in the Infants' grades or Primary grades. The preschooled group scored significantly better on the PPVT than the nonpreschool on every testing occasion. (The reader may be interested to note that this is only one of six instruments for which this is the case and the difference is the only one remaining between these two groups in the Mt. Druitt Longitudinal Study.) The PPVT sigma divergence between 1981 and 1982 (grades 3 and 4) for the preschooled group does reinforce the pattern established for ACER reading comprehension and vocabulary knowledge, adding weight to the suspicion that a progressive achievement gap may be opening up for the disadvantaged Mt. Druitt children.

While it is too early to interpret these results as indicating the emergence of a progressive achievement gap, which must await a further round of observation before a trend can be inferred, several matters are worthy of comment. First, in each of the comparisons there is a divergence in scores between the disadvantaged Mt. Druitt pupils and the criterion group in the year 1981-1982. The consistency of this funding adds weight to a warning of the possibility of a progressive achievement gap experience. Second, there is evidence that at various times the rate of learning, as measured by the tests used, of the disadvantaged group was at least as good as, if not better than, the advantaged or normal groups against whom they were being compared. It would be incorrect to label these Mt Druitt children as "slow learners". Explanations of a possible progressive achievement gap would need to concentrate therefore, on the children's opportunity to learn, rather than a problem in their ability to learn. It is possible that the Mt. Druitt Schools, particularly the Primary schools, have not yet adopted maximally effective strategies suited to their children. It is also possible that the assistance the advantaged group of children receive from their homes complements their school experience in ways which are reflected in their higher scores for these verbal and reading tests. It may also be that the disadvantaged children are not exposed in their life outside school to written and verbal materials at the same level or of the same challenge, or in the same way, as the advantaged group. This is to suggest that the homes of the children may be different (although it is not to suggest that any group of homes are "better" than any other) and that the disadvantaged schools may need to work even harder and faster to ensure the equitable development of their charges. Certainly anything the school could do to ensure the continued development of verbal skills and reading ability amongst Mt. Druitt children would be appreciated by their parents whilst the enthusiasm and commitment shown by the teachers of Mt. Druitt Schools would ensure a wholehearted trial of any innovation.

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